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Uptake of Best-Practice Recommendations for Management of Children Admitted to Kenyatta National Hospital

*A Longitudinal Study Employing Participatory
Research in a Complex Environment*

**Dr Grace W. Irimu, MBChB (UoN), Masters in Medicine
(Paediatrics and Child Health) UoN**

**Thesis submitted to The Open University for the award of
Doctor of Philosophy in Public Health**

Aug 2011

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Abstract

The need for improving practice in low-income settings has been demonstrated in recent research assessing the quality of hospital care. Consequently, the Ministry of Health developed clinical practice guidelines and an evidenced-based programme for their dissemination. This thesis explored what factors influence the uptake of the best-practice recommendations in a university teaching hospital.

This thesis used a mixed methods research approach that utilized a before and after design and participatory action research. This approach recognizes that health recommendations are compiled for universal use, but that their successful implementation requires particular attention to the individual and complex socio-political contexts of each setting, both at the micro and -macro level, which in this case was the Kenyatta National Hospital (KNH). This thesis is supported by eighteen months of participant observation, based on ethnographic research methodology and action research.

Patients' care was largely inconsistent with best-practice recommendations, with nine of the 17 key indicators having performance of below 10% in the pre-intervention period. The intervention had an absolute effect size of over 20% in eight of the 17 key indicators; three of which had an effect size of over 50%. The indicators that required collective efficacy achieved performance of less than 10% in the post-intervention period. The activities during the action research component failed to predict the trend in practitioners' performance, illustrating the difficulty of gaining a holistic understanding of the quantitative results using component parts of the qualitative results as the lens. The notion of professionalism provided an overarching understanding of the implementation process. There were clear gaps between the stated values espoused in the ideal of

professionalism and the observed actions of professionals in KNH. Gaps spanned knowledge management, expertise and skills, teamwork, conscientiousness and patient centeredness. I attributed the gaps in professionalism to complexity of professional development.

Declaration

This thesis is submitted for examination for Doctor of Philosophy in Public Health with our permission

Director of Studies: Prof Mike English

Date: 5th April 2012 Signature _____

Supervisors

Dr Alexandra Greene

Date: 19th March 2012 Signature _____

Dr Dejan Zurovac

Date: 10th April 2012 Signature _____

Candidate: Dr Grace W Irimu

I declare this is my original work, and no part of this thesis has been submitted before examination of a higher degree in any other university.

Date: 19th March 2012 Signature _____

Dedications

To my husband Peter and our children George, Elizabeth and Irimu

To the parents and children who have trusted in medical professionalism

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Abbreviations

| | | |
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| CPGs | - | Clinical Practice guidelines |
| EBM | - | Evidence-based medicine |
| ETAT | - | Emergency Triage Assessment and Treatment |
| ETAT+ | - | Emergency Triage Assessment and Treatment Plus admission care for the initial 48 hours |
| ICU | - | Intensive Care Unit |
| IMCI | - | Integrated Management of Childhood Illnesses |
| KEMRI | - | Kenya Medical Research Institute |
| KNH | - | Kenyatta National Hospital |
| MO | - | Medical Officer |
| MoH | - | Ministry of Health |
| NICU | - | Newborn Intensive Care Unit |
| PALS | - | Paediatric Advance Life Support |
| PEU | - | Paediatric Emergency Unit |
| PEW | - | Paediatric Emergency Ward |
| PFC | - | Paediatric Filter Clinic |
| Q1 | - | quarter 1 (January to March) |
| Q2 | - | quarter 2 (April to June), |
| Q3 | - | quarter 3 (July to September) |
| Q4 | - | quarter 4 (October to December). |
| SM | - | Severe Malnutrition |
| UoN | - | University of Nairobi |
| WHO | - | World Health Organization |

Definitions

MOH clinical practice guidelines - Ministry of Health Booklet of Basic Paediatric Protocols consisting of systematically developed evidence-based statements to assist the practitioner about appropriate health care for specific circumstance.

ETAT+ training - 5-day training for dissemination of the Ministry of Health 'Basic Paediatric Protocols'.

Best-practice recommendations - the MoH clinical practice guidelines and ETAT+ recommendations as well as practices implied by quality indicators agreed upon by the hospital staff.

Performance - adherence to best-practice recommendations.

Top-level management - the body responsible for KNH policy development (section 3.3).

Mid-level management – selected group of staff who were responsible for overseeing the operationalization of the hospital policies (section 3.3).

Front-line service providers - the health care providers who were involved in routine tasks such as admitting patients, conducting ward rounds and providing nursing care (section 3.3).

Hospital staff - KNH and UoN teams (academics and trainee paediatricians) who collectively were care providers for the seriously sick child in KNH.

Consultants - salaried paediatricians who were employees of KNH or UoN, they were involved in conducting post-admission ward rounds and major ward rounds.

Mortality meeting -term used in KNH and UoN to imply traditional unstructured clinical audit meeting.

Chapter 1

Background and Introduction

1.1 Background to the problem of quality of care addressed in this thesis

The need for improving practice in low-income settings has been demonstrated in recent international and local surveys assessing the quality of care for the sick child. These studies identified drug dose errors and poor compliance with evidence-based standards for care as some of the problems facing paediatric service delivery (Nolan, Angos et al. 2001; English, Esamai et al. 2004; English, Esamai et al. 2004; Laigong' 2006; Njuguna 2006; Maina 2007). Perhaps linked to this, mortality rates in some of the hospitals are as high as 15% (English, Esamai et al. 2004; Mwakyusa , Wamae et al. 2006). Many of these deaths could perhaps be averted by giving timely and appropriate hospital care to the seriously sick child.

1.2 Suggested strategies of improving quality of care

The desire to improve health workers' performance by ensuring that patients are correctly assessed and receive prompt, safe and effective treatment is not new. In high-income countries considerable investments have been made in evidence-based medicine and quality improvement approaches. English *et al* argue that to change health-workers' behaviour multiple approaches are likely to be required including printed clinical practice guidelines and training combined with job-aides, feedback and supervision or more general quality improvement initiatives (English, Irimu et al. 2007).

Clinical practice guidelines (CPGs) can be used to improve the provision of evidence-based care and have been shown to increase the likelihood of desired health-care outcomes (Grimshaw, Shirran et al. 2001). By systematically influencing clinical decisions the guidelines can also decrease variation in care provided and improve quality more broadly contributing to equitable health care provision (Perlstein, Kotagal et al. 2000). The CPGs

addressed in this thesis were evidence-based and were disseminated using a specially designed training programme (ETAT+) as explained below. While this thesis used ETAT+ to promote better clinical decision-making and enhance reflective and critical thinking, I will explore why adoption of evidence-based practices was a challenge. Proponents of evidence-based medicine argue that even experts are unlikely to provide better care for patients than can be identified from evidence derived from sound health care research (Haynes 2002). On the other hand critics argue that what constitutes evidence includes socio-political constructs that are contested and temporally and geographically variable yielding concerns for the quality of evidence employed in decision-making (De Vries and Lemmens 2006; Broom, Adams et al. 2009). Further, there are concerns that evidence-based practices suppress the role of clinical judgment with the potential to reduce skills in clinical decision-making amongst junior doctors (Broom, Adams et al. 2009).

1.3 Background to the best-practice guidelines utilized in this thesis

In an effort to reduce childhood mortality in hospitals in Kenya, the Ministry of Health (MoH) in collaboration with the KEMRI / Wellcome Trust Research Programme, the Kenya Paediatric Association and university teaching hospitals developed 'Basic Paediatric Protocols' in 2006 to improve emergency and admission care for the seriously sick child in the initial 48 hours of admission to a hospital facility (MoH 2006; Irimu, Wamae et al. 2008). The protocols comprised of guidance derived and adapted from international and local disease specific guidelines. Subsequently an evidence-based training programme, called "Emergency Triage Assessment and Treatment Plus admission care" (ETAT+), for dissemination of the MoH clinical practice guidelines (Basic Paediatric Protocols) was developed. A detailed description of ETAT+ is provided elsewhere (Irimu, Wamae et al.

2008). In brief, ETAT+ is derived from the WHO's emergency triage assessment and treatment (ETAT) course, the Paediatric Advanced Life Support (PALS) course and the MoH / WHO disease specific guidelines (WHO 2005; WHO 2005; UK 2006) and thus represents an approach to implementing referral level IMCI (Integrated Management of Childhood Illness – a major primary healthcare initiative). The ETAT and PALS approaches target emergency care for the initial 15-60 minutes of admission and deal with recognition of life-threatening conditions and prompt institution of life-saving interventions. ETAT+ extends these approaches to cover the continued care of a child with a common condition over the initial 48 hours. In addition reflection on current practice is encouraged by providing training and practice in mortality audit and by conducting hospital self-assessment exercises examining the preparedness of the hospital to give best-practice care to the sick child .

The Ministry of Health CPGs simplified disease specific protocols for most of the common serious childhood illnesses that have been in existence for a long period (WHO 1990; WHO 2000; MoH and WHO. 2002). In particular very similar guidance produced by WHO has been in use for teaching and, in theory, for guiding practice in the Kenyatta National Hospital since at least 2002 and, for conditions including diarrhoea and pneumonia, for much longer. It was my aim, therefore, to explore to what degree increasing active efforts at defining and implementing best-practice care, beginning in 2006, have been successful¹.

¹ A Child Health Evidence Week was held in June 2005 to present evidence supporting the MoH guidelines to the local experts. It was attended by some of the paediatricians practising in KNH. This was however not taken into consideration in designing the study to evaluate the effect of CPGs in performance of the clinicians.

1.4 Fundamental research question

Much of the effort in Kenya on improving quality of paediatric care for serious common illnesses focus on the district hospital (Ayieko, Ntoburi et al. 2011). There are few examples of implementation research conducted in the teaching hospitals in low-income settings, though they are the practical areas (analogous to laboratories) for the training of health professionals. The CPGs and ETAT+, described above, that were developed for use in the district hospitals were in high demand in the Kenyatta National Hospital (KNH), a tertiary care facility and University of Nairobi teaching hospital. Questions therefore arose: First within an institution that has had access to guidelines since at least 2002 what is the effect of introducing linked but locally prepared best-practice recommendations and ETAT+ training in KNH? Secondly, as there is evidence that training alone does not produce large changes in actual practice (Baig and Thaver 1997; Grimshaw, Thomas et al. 2004; Forsetlund, Bjørndal et al. 2009), what strategies might help improve the uptake of best-practice recommendations and to what extent are these acceptable to KNH staff and, how and why do efforts to promote uptake of best practices work or fail to work?

1.5 Importance of addressing this question

Hospital care of severe illnesses may help improve survival. Disease-specific clinical guidelines have been provided by the World Health Organization (WHO) for more than 20 years (WHO 1990) and were collated for ease of use into basic text-books beginning in 2000 (WHO 2000). However, prior work indicated that many of these guidelines are not used and implementation research has begun to address how best to introduce changes (Baig and Thaver 1997; Nolan, Angos et al. 2001; English, Esamai et al. 2004; Njuguna 2006; Karaolis, Jackson et al. 2007; Nzioki, Irimu et al. 2009; Osterholt, Onikpo et al. 2009; Ayieko, Ntoburi et al. 2011). Implementation research seeks to identify which techniques

are effective for the translation of evidence into practice, provide information about the real world variability in effectiveness and cost effectiveness of interventions, and understand the particularities of introducing and sustaining new treatments or services (Craig, Dieppe et al. 2007).

Translating knowledge into practice is, however, difficult (Baig and Thaver 1997; Grol 2003). It is estimated that up to 40% of patients do not receive care that conforms to the best available scientific evidence and that more than 20% of care is not needed or is harmful (Grol 2003). Studies with well designed strategies to facilitate knowledge translation have documented an average of about 10% change in compliance to guidelines (Grimshaw, Thomas et al. 2004). The majority of these studies have been conducted in high-income countries with a different disease profile to low-income countries, variable study settings in regard to resources and varying hospital and professional appraisal systems. Furthermore, most of the studies have targeted individual disease entity for example asthma, pneumonia, urinary tract infections or chronic diseases and they have often targeted one aspect of practice such as drug prescription. In low-income countries' hospitals a child usually has multiple diagnoses and patients seek care late such that they often require life saving interventions upon arrival in the emergency department. Other problems in low-income countries include staff shortage and inadequate essential drugs and equipment (Nolan, Angos et al. 2001; English, Esamai et al. 2004; English, Esamai et al. 2004). These factors make generalization of results of high-income country implementation studies problematic.

Assumptions underlying the model used to improve care in this thesis: Use of the ETAT+ model to improve health workers' performance makes three major assumptions. First, evidence-based practices will provide superior patient care compared with that given by

practitioners who rely on understanding of basic mechanisms and their own clinical experience (Haynes 2002). While so far there is no convincing evidence to show that this assumption is correct (Haynes 2002; Lambert 2006), I argue that it is more likely to be true where the performance of health workers is deemed poor (English, Esamai et al. 2004; Nzioki, Irimu et al. 2009) rather than in situations where the majority of professionals continuously read and learn (Lewis 2007). Arguably KNH is a setting where there has traditionally been little emphasis on continuous professional learning related to emergency care.

Secondly, the ETAT+ model assumes that the knowledge embodied in the CPGs is uncontested and that, rationally, increased usage of the guidelines merely requires an increase in dissemination. This model thus ignores the complex and contingent nature of research use and the fact that other forms of knowledge may influence the practice and use of the guidelines (Nutley, Walter et al. 2008). Thus Haynes *et al* argue that in evidence-based decision-making research evidence alone is not adequate to guide action (Haynes, Devereaux et al. 2002). Rather clinicians must apply their expertise to assess patients' problems and must incorporate the research evidence and patient's preferences and values before making a management decision (Haynes, Devereaux et al. 2002).

Thirdly, ETAT+ is a rational-linear model of research use. It assumes that when clinicians are provided with evidence of recommendation based on locally acceptable and good quality findings the practitioners would want to implement the recommendations (Nutley, Walter et al. 2008). Such a rational approach is assumed to override competing priorities or interests.

1.6 Justification of selection of study site

Since 2002 the Department of Paediatrics of University of Nairobi (UoN) has provided basic teaching to approaches to management of common childhood diseases based on the WHO book 'The Management of a Child with a Serious Infection or Severe Malnutrition' (WHO 2000). It is thus reasonable to consider that the clinical practices in KNH, the UON teaching hospital, should have been influenced by these WHO guidelines at least since 2002².

In 2005 the WHO book 'The Management of a Child with a Serious Infection or Severe Malnutrition' was updated and published as 'A Pocketbook of Hospital Care for Children' (WHO 2005). For the key conditions, pneumonia, diarrhoea and severe malnutrition the practice guidance, however, remained essentially unchanged. The MoH 'Basic Paediatric Protocols', referred to in this thesis as clinical practice guidelines (CPGs), and the ETAT+ training course summarized the best practice guidance provided in the WHO's pocketbook (MoH 2006; Irimu, Wamae et al. 2008). In a parallel activity, in 2006, KNH developed standard operating procedures for admission of the seriously sick child whose contents included practice guidance on management of the common childhood illnesses that was drawn from the same WHO source documents. This was in response to an Emergency Triage Assessment and Treatment course held in KNH in 2002.

The ETAT+ course was piloted from early 2006 and included amongst participants on three early courses senior paediatricians, trainee paediatricians, clinical officers and senior nurses from KNH. These pilot trainings indicated that the training materials were

² To emphasize the importance of WHO guidelines, knowledge of the guidelines is assessed in both undergraduate and postgraduate continuous assessments and the final examination (personal observation).

acceptable for a tertiary health facility although they had initially been designed primarily for district hospital settings. Those trained or those obtaining copies of the CPGs used the ETAT+ approaches on an *ad hoc* basis thereafter. Since then, KNH and UoN have embraced the use of the CPGs and ETAT+ as a way of standardizing and improving the initial care of serious common childhood illnesses. These activities contributed to requests for a more broadly based approach to training and implementing the guidelines leading to the first training targeting trainee paediatricians in January 2007. This created a tension for change among the practising paediatricians in KNH and UoN who in June 2007 requested to be trained. This point also represented a form of local 'needs assessment' with senior staff from all cadres of health workers recognizing that care for sick children in KNH needed to be improved. The senior academics in UoN then recommended all the trainee paediatricians be trained in ETAT+ in two trainings that were held in October and November 2007. Henceforth, new trainee paediatricians have undertaken ETAT+ training in October/ November each year, as an induction course before they are allocated ward duties. A number of these trainee paediatricians have now become instructors in the ETAT+ training. In January 2008 a modified three-day ETAT+ course was included in the undergraduate curriculum as a 'block course'. Since 2008, ETAT+ is an examinable subject for the undergraduates and postgraduates training in the Department of Paediatrics, UoN.

It was as a result of the June 2007 'local needs assessment' and the increasing intensity of training in late 2007 that the question arose of what was actually being achieved. Were efforts resulting in changes in practice and thus in an improved quality of care? The work described in this thesis was a direct response to this question and was felt to be necessary as an assessment of the paediatric services in KNH conducted in July 2006 by the MoH identified inadequate knowledge of modern case management approaches and lack of

essential equipment for delivery of care to the sick child as key problems. These problems were consistent with recent local studies on care of the seriously sick child in KNH (English, Esamai et al. 2004; Laigong' 2006; Njuguna 2006; Maina 2007; Ayieko, Ntoburi et al. 2011). One response to such findings was the recommendation that staff needed better information, training and more supportive infrastructure to promote change and sustain new practice behaviours. As training had already begun the opportunity arose to examine whether providing the CPGs and ETAT+ training do influence practices in KNH and, further, to study the value of strategies that might improve uptake of ETAT+ recommendations. Therefore to evaluate the impact of the Ministry of Health CPGs and ETAT+ on care of the seriously sick child on admission, this study focused on adherence to best-practice guidelines for care of children with three common diseases namely pneumonia, diarrhoea and severe malnutrition.

Though KNH is a national referral hospital, 35% of the annual admissions in the general paediatric wards are due to pneumonia while diarrhoea and severe malnutrition account for 23% and 2% of the admissions respectively. At the commencement of this study the overall mortality rates in general paediatric wards was 13% with 84% of the deaths occurring in children below 5 years of age. Pneumonia, diarrhoea and severe malnutrition were responsible for 29%, 17% and 6% respectively of these deaths. Half of these deaths occurred in the first 48 hours of admission (Source: Central Hospital Records, KNH). These three conditions were chosen as the focus because of the high disease burden and / or high case fatality, the availability of explicit WHO guidelines for case management that have remained unchanged since 2000 and because these WHO guidelines have been the basis for recommended practice in UoN / KNH since 2002 or earlier. Monitoring uptake of recommended practices before and after introduction of ETAT+ training and CPGs would

provide an indication of whether these interventions were actually changing the quality of care.

Recently, Ayieko *et al* reported on a multifaceted intervention to implement guidelines and improve admission paediatric care in Kenyan district hospitals. The study showed that before intervention disease-specific treatment practices were poor, rarely conforming to guideline recommendations. The intervention in the district hospitals improved quality of care across a set of common, serious childhood conditions and over a prolonged period (Ayieko, Ntoburi et al. 2011). Drawing on this observation, I argue that interventions will probably have a greater chance of success and potentially higher impact on child survival in Kenya if delivered in academic medical hospitals. By so doing, the new graduates will be made aware of and therefore familiar with the guidelines before being posted to the district hospitals. This is probably one way of making progress to achieve the 4th Millennium Development Goal.

1.7 Methodology

This thesis used a mixed method research approach that utilized a before and after design and participatory action research. This approach recognized the growing concern with the interaction of context and intervention to understand the effects achieved (Greenhalgh, Roberts et al. 2004; Grimshaw, Thomas et al. 2004; Kaplan, Brady et al. 2010; Ayieko, Ntoburi et al. 2011). Participant observation, based on traditional ethnographic research methodology, allowed a context driven description of the implementation process and the alternative approaches to achieving effects introduced through the action research. To ensure the benefits of mixed method research are realized, the results of the quantitative and qualitative results are integrated to maximise insights derived from the study (O'Cathain, Murphy et al. 2007).

1.8 Outline of the thesis

The current chapter provides the background to this thesis by describing the best-practice guidelines, the fundamental research questions and the importance of addressing these questions.

Chapter 2 provides a literature review which discusses the interventions aimed at changing professional behaviours and the factors that influence success of these interventions. It further discusses outcome measures of implementation research and discusses, in outline, the design of studies aimed at changing health professional and institutional practices.

Chapter 3 describes aspects of Kenyatta National Hospital that are relevant to this thesis. It therefore provides a description of the context within which this study was undertaken.

Chapter 4 explains the aims and objectives of this PhD thesis and discusses why mixed methods research is an appropriate approach to answer the research questions posed. The chapter describes the before and after study design used to evaluate the effect size of the intervention. This is followed by a detailed description of participant observation as applied in this thesis. Interpretative descriptive, the method of data analysis used in the qualitative research is described while the theoretical and philosophical frameworks of the methods adopted and their implications for the research findings are also presented. Finally the chapter describes how the quantitative and qualitative results were integrated to produce stronger inferences.

Chapter 5 is divided into three parts for clarity. The first part describes my attempts to engage staff and management so they were predisposed to make best practices *routine* by enabling them to participate in the study. Then I describe enabling the staff and management to monitor progress of uptake of best-practices and identify impediments to

implementation and how solutions were implemented. I considered my level of engagement and that of the hospital staff and the extent to which the principles of the participatory approach were enacted. I illustrate how approaches evolved with KNH staff in response to a 'trial and error' learning process. Finally I describe my reflection on the action research.

Chapter 6 seeks to shed light on the findings of the quantitative research (chapter 7) by illustrating what facilitated or hindered the provision of patient care in KNH in line with the best-practice recommendations. The factors considered are those that influenced patient's assessment, illness classification and treatment, monitoring and follow-up for the initial 48 hours of admission to the wards.

Chapter 7 presents the results of serial observations of the study's primary process of care indicators for patients admitted with pneumonia, dehydration and severe malnutrition. I have categorized processes of care in four domains namely assessment, classification, treatment and follow-up of patients on the ward. For each of the domains I present the effect size of the intervention, by comparing the performance of composite process indicators in 2005 and 2009 and finally present trends of change of the performance over the five years (2005-2009).

Chapter 8 explores the complex and dynamic interaction between the contexts (chapter 3), interventions (chapter 5) and uptake of best-practices by drawing together the quantitative results (Chapter 7) and factors that influenced implementation of best-practices (Chapters 6). I provide an additional ethnographic lens through which to examine the implementation of ETAT+ recommendations and subsequent changes in practice informed by social science methodologies from the interpretive perspective, and psychological approaches in social cognitive theory and complex adaptive system theory

Chapter 9 is the discussion and provides recommendations and conclusions. It provides a summary for the entire thesis and highlights the key findings. This chapter discusses the implications of the theory used in designing this study and the action research. It also makes practical recommendations with regard to medical education, hospital leadership and institutional collaboration between KNH and UoN.

1.9 Scope of thesis

The quantitative study is based on three illnesses namely pneumonia, diarrhoea and severe malnutrition. It is assumed that experiences in the management of these three diseases, will give an insight into the quality of care of the other acute illnesses learned in the ETAT+ training.

The qualitative study mainly focused on the doctors' behaviour because most of the tasks targeted by the quality indicators agreed upon by the KNH staff were performed by the doctors. It is assumed that by exploring the behaviour of doctors and their interaction with other staff that important insights would be gained regarding behaviour of other professionals.

1.10 Conclusion

In this chapter I have laid out the background of the thesis by introducing the problems and the questions addressed. I have justified why examining this problem is important and given an overview of the methodological approach and why this approach was found appropriate for addressing this question. I have provided a road-map into the entire thesis by giving a brief overview of the issues explored in each chapter.

Chapter 2

Literature Review

The aim of this chapter is to present a brief review of literature drawn from research describing interventions aimed at changing health professionals' behaviour to enhance uptake of best-practice recommendations, often codified as guidelines. This is achieved by outlining the interventions aimed at changing professional behaviours and the factors that influence implementation of these interventions. I will outline some outcome measures of implementation research and finally present an outline of designs of studies aimed at changing health professional and institutional practices.

2.1 Interventions Aimed at Changing Professional Practice

Several interventions have been used in attempts at changing health workers' behaviours. EPOC (Cochrane Effective Practice and Organization of Care Group) has classified strategies based on pragmatic descriptions of the components of an intervention (Grimshaw, Thomas et al. 2004). These strategies are now listed individually but may be combined in several ways.

- a) Distribution of educational materials: published or printed recommendations for clinical care including clinical care guidelines, delivered personally or through mass mailing.
- b) Educational meetings: health care providers who have participated in conferences, lectures, workshops or traineeships.
- c) Local consensus processes: inclusion of participating providers in discussion to ensure that they have agreed that the chosen clinical problem was important and the approach of managing the problem was appropriate.

- d) Educational outreach visits and academic detailing: use of a trained person who meets with providers in their practice setting to give information with the intent of changing the provider's practice.
- e) Local opinion leaders: use of providers nominated by their colleagues as 'educationally influential'.
- f) Audit and feedback: any summary of clinical performance of health care over specified periods of time.
- g) Reminders: patient or encounter specific information provided verbally, on paper or on computer screens that are designed or intended to prompt a health care provider to recall information, such as computer aided decision support for drug dosages.
- h) Marketing: survey of targeted providers to identify barriers to change and subsequent design of an intervention that addresses identified barriers.

2.1.1 Evidence of impact of interventions on practice change

Interventions have variable effects on the outcome of interest. The outcomes also vary; they could be improvement of process of care or patients' outcomes. The following terms are used to describe the size of effect (absolute difference between pre-intervention and post-intervention) (Grimshaw, Thomas et al. 2004)(pg 10): i) 'Small' to describe effect sizes $\leq 5\%$, ii) 'modest' to describe effect sizes $> 5\%$ and $\leq 10\%$, iii) 'moderate' to describe effect sizes $> 10\%$ and $\leq 20\%$ and, iv) 'large' to describe effect sizes $> 20\%$. These cut-offs are arbitrary. In low in-come countries different cut- offs have been suggested. For example, a large effect size is $> 30\%$, moderate effect size $10-30\%$ and no impact as $< 10\%$ (WHO 2001). Other authors suggest large effect size $> 25\%$, moderate effect size $10-25\%$ and low effect as $< 10\%$ (Rowe, Hamel et al. 2000). I will now describe some of the common

interventions used to promote uptake of guideline recommendations by health workers and their impact in changing practice.

Distribution of educational materials

Educational materials include guidelines, protocols, manuals and audio-visual materials.

There is overwhelming evidence that educational materials alone have little or no effect in inducing compliance with recommended standards (Davis and Taylor-Vaisey 1997).

Grimshaw *et al* in their systemic review concluded that educational materials may have a modest effect on guideline implementation that may be short lived, however, evidence is sparse and of poor quality (Grimshaw, Thomas *et al.* 2004).

Educational meetings

Educational meetings include sessions that can be delivered in the form of conferences, seminars, short training courses, grand rounds, workshops, tutorials and other didactic methods of knowledge transfer. In a recent Cochrane review, Forsetlund *et al* suggested that educational meetings can result in small to moderate improvement in professional practice and small improvement in patients' outcomes (Forsetlund, Bjørndal *et al.* 2009).

The authors further illustrated that mixing interactive and didactic education was more effective. Their findings suggested that educational meetings are unlikely to improve practice for highly complex behaviours. Other studies have also shown that educational meetings alone have little lasting effect on health workers performance (Baig and Thaver 1997; Haines, Kuruvilla *et al.* 2004). Educational meetings as well as educational materials may, however, be prerequisites for the other interventions.

Opinion leaders

Opinion leaders are educationally influential and respected clinicians who influence practice behaviour through peer pressure and behaviour modelling. They attempt to convince colleagues that non conforming practice is outdated, inappropriate, not

supported by research evidence and, no longer acceptable by peers in similar settings. They have been found to have a higher impact on behaviour change compared to audit and feedback or lectures alone (Seto, Ching et al. 1991; Lomas, Enkin et al. 1991). Expert opinion leaders exert their authority and status while peer leaders influence the acceptability of an innovation through their representativeness and credibility (Locock, Dopson et al. 2001). Opinion leaders can have either a positive or a negative influence. The latter can happen if the opinion leader is monomorphic (influential for a particular innovation only) as opposed to polymorphic (influential across a wide range of innovations) (Locock, Dopson et al. 2001; Rogers 2003).

Reminders

Reminders consist of prompts either before or during a patient encounter that suggests that a specific behaviour should or should not be performed. They include notes in patient's chart, wall charts, messages appearing on computer screens or computer based job aides that guide the practitioner on the appropriate process of care. Reminders reduce the amount of recall necessary to perform according to standards but they may not be useful where there is deficiency in knowledge or skill. They have a moderate positive effect on performance according to standards but the effect disappears when they are stopped; so they must be applied continuously and be incorporated into daily routines (Simoes, Desta et al. 1997; Grimshaw, Thomas et al. 2004). Non computerized reminders have positive impacts on assessment but lower performance scores for treatment (Baig and Thaver 1997; Simoes, Desta et al. 1997).

Audit and feedback

Audit and feedback involve collection of data on health-workers' performance and then feeding the information back to the health workers. Feedback may include comparison of performance with accepted standards or with providers in another setting

(benchmarking). It assumes that notifying individuals or groups about nonconformity with accepted standards will lead to improved performance (Jamtvedt, Young et al. 2010). Audit and feedback result in small to modest improvements in compliance to guidelines (Grimshaw, Thomas et al. 2004; Jamtvedt, Young et al. 2010).

Audit and feedback is more effective if it is: i) from credible sources and presented by credible colleagues or academics (Buntinx, Knottnerus et al. 1993), ii) part of a larger study aimed at practitioners who are receptive to review of their practice (Mugford and Banfield 1991; Buntinx, Knottnerus et al. 1993), iii) accurate and presented close to the time of decision-making (Buntinx, Knottnerus et al. 1993; Green 1998; Grimshaw, Thomas et al. 2004), iv) personalized (Wensing, Van der Weijden et al. 1998), v) baseline adherence to recommended practice is low (Jamtvedt, Young et al. 2010), and vi) when feedback is delivered more intensively (Jamtvedt, Young et al. 2010).

In a recent systematic review to assess the effect of audit and feedback, Jamtvedt *et al* concluded that evidence drawn from the 118 studies reviewed did not support mandatory use of audit and feedback as an intervention to change process. They however acknowledged that audit is essential to measure practice so as to know when efforts to change practice are needed (Jamtvedt, Young et al. 2010).

Multifaceted interventions

Barriers to achieve desired performance are diverse, suggesting combined strategies may have advantage of being able to simultaneously address different types of barriers. However, in a systematic review of the effectiveness and efficiency of guidelines dissemination and implementation strategies, Grimshaw *et al* suggested that there is no clear relationship between number of interventions and effect size (Grimshaw, Thomas et al. 2004). Jamtvedt *et al* in a systematic review also concluded that there is no difference

in relative effectiveness of multifaceted interventions and audit and feedback with or without educational meetings (Jamtvedt, Young et al. 2010).

Interventions to improve professionals' performance are complex and thus careful interpretation of trials is required considering the professionals studied, interventions used and study designs. Oxman *et al* in a systematic review of 102 trials of interventions to improve professional practice concluded that there are 'no magic bullets' for improving quality of health care, rather there are a range of interventions available that if used appropriately could lead to substantial improvements in clinical care (Oxman, Thomson et al. 1995). Therefore, despite many years of implementation research, we lack a robust generalizable evidence base to inform decisions about strategies to promote the introduction of guidelines or other evidence-based messages into practice (Grimshaw, Thomas et al. 2004). Thus, Rowe *et al* suggest that strategies to promote guideline uptake be aligned with other initiatives in health system research so that time and resources are not wasted (Rowe, Savigny et al. 2005).

2.2 Factors Influencing the Implementation of Interventions

I have so far illustrated that most of the interventions to promote uptake of guidelines recommendations produce modest, small or no effect. In fact, about two thirds of organizations' efforts to implement change fail (Damschroder, Aron et al. 2009). Implementation is a socially constructed process that is intertwined with the context in which it takes place (Damschroder, Aron et al. 2009). Thus, no single factor will guarantee widespread adoption. Innovations undergo lengthy periods of negotiation during which their meaning is discussed, contested and reframed. In reflecting on factors that affect adoption of an innovation, it is important to understand the unit of adoption. The unit of

adoption could be an individual or the team, department or organization. Adoption at the broader level is called assimilation. At the organizational level, the assimilation of an innovation is a non-linear process characterized by multiple shocks, setbacks and unanticipated events (Greenhalgh, Roberts et al. 2004) .

In this section I will discuss the factors that influence the implementation of interventions. For clarity, I categorize these factors in four domains: innovation attributes, individual health worker factors, organization factors and, patients' related factors. These domains are interrelated and interact in a complex way to influence implementation effectiveness.

2.2.1 Attributes of innovation

The attributes of innovation listed here are based on Rogers' review based on diffusion of innovation theory (Rogers 2003) as well as on recent empirical studies on diffusion of innovation in health care.

Relative advantage: Innovations with clear advantages in either effectiveness or cost-effectiveness are more easily adopted and implemented (Gustafson, Sainfort et al. 2003).

Compatibility: Innovations that are compatible with the intended adopters' values, norms and perceived needs are more easily implemented (Rashidian, Eccles et al. 2008; Carlford, Linberg et al. 2010). Changes perceived as threatening or incompatible with current conditions will be resisted.

Complexity: Many changes are unnecessarily complex. If an innovation is easy to use and the tasks are clearly defined, relevant to the intended user's work and improve performance, it will be adopted more easily. Perceived complexity can be reduced by practical experience and demonstrations as well as breaking down the innovation into manageable parts and introducing it incrementally. The tasks which require specific

technical skills, for example, diagnosis and treatment may be difficult to change compared to tasks like history taking and giving patients advice on home care (Bradley and Igras 2005). Thus, changing practice for a condition requiring multiple processes of care is a challenge. For example, guidelines for severe malnutrition have seven steps for the initial management of the child. In an examination of their uptake, Deen *et al* demonstrated that components which required more time than routine practices were not consistently implemented. For example, measurement and recording of feeds, frequent feeding at night, prescription of catch up formula and routine use and preparation of ReSoMal (Rehydration Solution for Malnutrition)(Deen, Funk et al. 2003). For the latter, the staff preferred to use conventional oral rehydrating solution plus breast milk, water and other fluids.

Trialability: An innovation which can be tried out by the intended adopters is likely to be adopted (Rogers 2003).

Observability: Consequences of change determine implementation success. Innovations whose benefits are visible, for example through demonstrations, are adopted more easily than those without. Changes that can be measured and tracked tend to be implemented more successfully; this can be achieved through audit and feedback.

Flexibility of design/Reinvention: Successful implementation is more likely if the innovation can be refined and modified to fit existing culture and practices and suit the adopters' needs.

Evidence strength and quality: Finally, the actors' perception of the quality and validity of evidence supporting the belief that the innovation will have desired effects may improve implementation outcomes (Cabana, S et al. 1999; Grimshaw, McAuley et al. 2003; Ferlie, Fitzgerald et al. 2005) .

2.2.2 Individual health professionals

Individuals are agents, with a propensity to make choices and wield power, influence or be influenced by others, with predictable or unpredictable consequences for implementation. In the context of implementation research in health, Damschroder describes individuals as carriers of cultural, organizational, professional and individual mindsets, norms, interests and affiliations (Damschroder, Aron et al. 2009). Thus, attributes of individual and groups of health professionals can influence implementation of interventions as discussed below.

Prior knowledge: Correct knowledge often does not translate into better performance. Health workers do not simply replace their pre-existing knowledge with knowledge on new guidelines; rather they modify their practices to incorporate none, some or all of the new guidelines (Rowe, Savigny et al. 2005). This may explain why, though poor performance had been attributed to lack of knowledge and skills, training has shown mixed and sometimes disappointing results.

Teamwork: Strong social and cognitive boundaries' between local professionals and professional groups retards spread of innovation within an institution (Ferlie, Fitzgerald et al. 2005).

Tension for change: If the staff perceive that the current situation is intolerable or they are dissatisfied with the current process, a potential innovation is likely to be assimilated successfully (Gustafson, Sainfort et al. 2003).

2.2.3 Organizational structure

Organizational structure such as leadership, supervision and task allocation may hinder or promote implementation of an intervention as illustrated below.

Staff needs assessment, involvement and support: Involving the intended adopters in the development stage enables the researcher to incorporate the users' perspectives and values (Rogers 1995). However, health-workers' work overload and lack of time are associated with implementation difficulties (Michie, Pilling et al. 2007).

Leadership: Leadership commitment, involvement and accountability are key features of successful implementation. To have this support, the innovation and the change effort should be consistent with and contribute to achieving the organization's goals (Green 1998; Kitson and Harvey 1998; Gustafson, Sainfort et al. 2003). Linked to leadership skills, organizations in which the staff have clear roles and responsibilities, effective team work, and rewards and incentives are likely to implement interventions successfully (Kitson and Harvey 1998; Ferlie, Fitzgerald et al. 2005; Hayes, Murray et al. 2010).

Supporters and opponents of change: Success of implementation of change depends on the support by informal opinion leaders to counteract opposition from the laggards (Rogers 2003). Opinion leaders are more likely to support change if the organizational norm is to adopt changes.

2.2.4 Health care user environment

Patient-centred organizations are likely to implement change effectively (Damschroder, Aron et al. 2009). However, patient involvement in the decision-making process has also been cited as hindering guideline uptake because of clinicians' time constraints (Le'gare', Ratte' et al. 2008). Illness severity has also been identified as a factor that influences guidelines uptake. Patients perceived to have severe illnesses may be given treatment perceived as better treatment through experience (Hayes, Murray et al. 2010), thus hindering adherence to guidelines recommendations.

One limitation of the studies described above is that they identify barriers as the immediate operational constraints (micro-level factors) rather than getting to the root cause of these barriers. I argue that constraints beyond the control of one individual initiative may have underlying factors that are interdependent which may not be identified if relations between services or actors are not taken into account. There is need to take a more system-wide perspective, recognize the complexity of the barriers and the complexity of the context in which solutions must be implemented. Travis *et al* caution that tackling root causes of failure takes longer and the solutions are more difficult to advance, but without them, the easier short term solutions such as training and increased funds are likely to lead to only limited success (Travis, Bennett *et al.* 2004).

Due to the complexity of studies of diffusion of health services innovations, experts in implementation studies and policy makers (Green 2001; Greenhalgh, Roberts *et al.* 2004) recommend that researchers should focus on the process rather than be 'package' oriented. For example, they should focus on 'how things work' as well as answering questions framed in terms of causal inference (whether they work). Research should be participatory and engage 'on-the-ground' service practitioners as partners in the research process. Locally driven programs produce more useful research questions and data that are more valid for practitioners and policy markers (Bradley, Mayfield *et al.* 2002; Bradley and Igras 2005).

The factors discussed in section 2.2 above largely focus on 'what' may influence uptake of best practices. To try and understand 'why' implementation may fail, and by way of attending to any assumptions about the ready acceptance of protocols by practitioners and managers, it is helpful to explore discussions on the role of agency, structure and power. I argue that an investigation of these will provide a useful way to describe why and how participants' situations (e.g. as professionals in the organisation), together with

their perception and experience of opportunities, may influence their buy-in or not of ETAT+ recommendations. I will expand on these issues in the following section

2.3 Power, structure and agency

Within the sociological debates regarding the interplay between structure and agency, networks of power relationships exist between people as individuals or as part of a community, in a way that influences their actions. This perspective will be explored in attempt to understand the influence of power, institutional design and behaviour.

To illustrate the direction of the argument in this thesis, it is useful to reflect briefly on Foucault's perspective on medicine and his attention to the relationship between power, knowledge and the human body (Foucault 1976; Foucault 1980). In his work, he argues that ideas of conflict and resistance presuppose an initial situation of power which may, in fact, be invalid, as illustrated by Arney and Bergen's criticism of this (Arney and Bergen 1983) (pg 3)

“Power’ is [not] a template to be placed over social interactions in order to judge adherence to or deviations from preconceived notions of ‘power relations’. In order to study power it is better to begin with the concrete: specific demonstrations of power at their point of application.’

The approach, which I favour, is that relationships can best be understood as a consequence of investigating the ethnographic situation. In the KNH setting, power does not reside in pre-existing institutional arrangements, or in battles between the participants. Rather it emerges, or does not emerge, in relation to the ever-changing circumstances at hand. This does not ignore the fact that the participants concerned, as part of their language, may use the word ‘power’ to comment, or reflect upon, what has

unfolded (Riches 1985). Accordingly, I will argue against epistemological positions of power and structure (and agency), as pre-existing concepts divorced from reality and subjectivity.

In the context of best-practice implementation, power is a feature of relationships between different professions, individuals or groups, which influences the implementation process of other health care providers. Power manifests as exertion of influence upon the actions of others and therefore exists only when it is put into action. Anderson and Berdalh argue that power is contextual, defined with reference to a particular relationship or group. The contextual nature of power differentiates it from dominance or tendency for individuals to behave in assertive, forceful and self-assured ways across a variety of contexts (Anderson and Berdalh 2002). Power is only exercised on free subjects and only in so far as they are free. Where the determining factors deny the people options there is no relationship of power instead there is authoritarian practice or coercion. Power therefore has been differentiated from social roles such as leadership, status and authority that endow individuals with power (Anderson and Berdalh 2002).

Lukes describes three types of power. Power over others (prevailing over the opposition of others), power over others that is dominating (imposing an agenda on people) and finally a third dimension power (influencing peoples' desires, beliefs and judgement in ways that work against their interests). The latter is usually hidden from observation (Hayward and Lukes 2008). The third dimension is particularly relevant in this thesis. The CPGs, ETAT+ training, my position as ETAT+ instructor and CMEs and audit feedback facilitator had the potential to influence people's behaviour in ways against their interests. An effect that I believe was moderated by the participatory approach (chapter 5) used in this thesis.

Lukes agrees that social and structural constraints and opportunities may limit, guide or shape individuals' behaviour but disagrees that they are uniquely determining and as agents may or may not seize the opportunities. Hayward argues against dichotomizing structural constraints and constraints caused by powerful autonomous agents because agents act within social boundaries set by structures such as rules, laws and norms. Structure, she argues, does not determine action rather it shapes action through social expectation and social meaning, which agents continually interpret and re-interpret (Hayward and Lukes 2008). These structures are the products of historical processes and human beings collectively construct the structure of our world. The world is therefore alterable by human agency.

Social structure is maintained and changed by what people do or fail to do. It should therefore not be reified and it is not autonomous or self regulating. Musolf argues though many people find themselves in wretched, oppressive, exploitative situations that rob them of resources and opportunities, these structures are not eternal, but exist in historical times and are the products of historical processes. He adds that human beings have collectively constructed the structure of our world and that the world is alterable by human agency (Musolf R 2003). These propositions refute an ideology of determinism. To be an agent is to influence intentionally ones functioning and life circumstances. The power to originate action for a given purpose is the key feature of personal agency (Bandura 2001; Musolf R 2003; Reader 2007). Thus, personal influence is part of the causal structure. Social cognitive theory (section 8.1) is underpinned by an agentic perspective toward adaptation and change. Bandura proposed four core features of human agency: intentionality, forethought, self-reactiveness and self-reflectiveness (Bandura 2001). From a philosophical point of view, Reader suggests that we should broaden our agential conception to include patiential (non-agential) features to offer an

account of personhood that is more balanced and realistic (Reader 2007). As alluded to above, agency is equated to actions, Reader proposed the term 'patient' to be used when a being is acted on (Reader 2007)(pg 581). In contrast to an agent, a patient refers to the silenced and 'othered' passive aspect of personhood, the beings at the receiving end that are acted by agents (pg 582). Therefore, for every action there is an agent and a patient. Agents suffer when they act, and they also suffer the actions of other persons and things in the world.

2.4 Measurement of Quality of Care

Having discussed the factors that influence implementation of interventions, I now turn to issues of measurement. If we wish to monitor whether practices are improving, we first need definitions of what is desired or what standards are wanted, so that observed practices can be compared with desired practices using measurement tools. Best-practice, evidence-based guidelines provide the basis of many standards of care. The overall quality of care can be conceptualized and measured by observing its structure, process and outcomes (Donabedian 1996), (structure here is used in a different sense to that described earlier in the thesis linked to power and agency).

Structural measures provide indirect quality of care measures related to the physical setting, organization of care and the availability of resources. This may include availability of staff, space, supplies and equipment used to deliver medical care. When examining the uptake of new practices, it is intuitively sensible to assess whether available resources are adequate to allow best practice care to be provided. Nevertheless, it does not follow that having the right resources means practices are correct.

Process of care measures examine the degree to which health workers perform tasks agreed to represent good care. In this case, process measures look at whether health workers follow best-practice recommendations. Many different process-based measures are needed to comprehensively assess quality of care. The advantages and disadvantages of process-based measures of health care quality have been described elsewhere (Palmer H.R 1997; Rubin, Provonost et al. 2001; Pronovost, Nolan et al. 2004). However, with regard to the work proposed, measures of process of care can help monitor whether best-practice recommendations are being followed (an aspect of clinical competence) and to identify aspects of care which need to be improved. When defining which processes of care to measure, the starting point should be standards that take into account the local opinion over which practices are most important and the degree to which local staff have the power to change the way care is provided.

Outcomes can include a range of measures. These include survival rates, morbidity rates (complications of disease or therapy), costs, patients' understanding of discharge instructions and length of hospital stay among others. Outcome based measures may indicate the need to improve but often do not reveal exactly what is necessary to be done to improve. In addition, issues such as poor quality data, variable case mix, variable case severity and epidemics are associated with difficulties in interpretation of outcome measures in low-income countries (English, Irimu et al. 2007).

Whatever indicators are used they should ideally be objective, quantifiable and easy to measure. Once the desired behaviours and practice changes have been defined and a means to implement them considered, an appropriate study design is required.

2.5 Designs of Studies Aimed at Changing Health Workers Behaviours

The choice of design will depend on the research questions, purpose of evaluation and the control the researcher has over the delivery of the interventions. In general, the design chosen should have high internal validity by minimizing potential bias while still maximizing external validity (that is the ability to generalize results to other situations). One threat to generalisability of results is that studies are conducted in an 'ideal world' with tight exclusion criteria to avoid non-adherence to the intervention while at the same time conducted by highly motivated research staff. Thus, 'dose' of intervention is greater than that which can be achieved in routine circumstances and the context within which intervention occurs is no longer routine. In this case one measures efficacy, that is, the extent to which an intervention does more good than harm under ideal circumstances (can it work?). In comparison, effectiveness assesses whether intervention does more good than harm under usual circumstances of health care practice (does it work in our practice?). Even if an intervention works well in a 'can it work?' study, it may not work well in usual care (Haynes 1999).

In the section that follows I will discuss design of studies of implementation research with attention to the research designs used in this PhD thesis.

2.5.1 Quantitative studies

The most robust designs for assessing practice-change or quality improvement strategies are randomized (experimental) designs. They estimate the impact of an intervention through direct comparisons with a randomly allocated control group that does not receive the intervention under study or that receives an alternative intervention. Randomized trials should, however, only be considered when there is genuine uncertainty

about the effectiveness of an intervention to justify withholding the intervention from some subjects (Hennekens and Buring 1987).

The randomized designs can be individual patient randomized controlled trials or cluster randomized. The strength of these studies is that the process of randomization helps to ensure that both known and unknown confounders are likely to be comparable between the trial groups. In these experimental designs, the groups must retain their intervention or non-intervention status otherwise contamination across groups may affect the intervention's impact with results becoming difficult to interpret. For example, in delivering an intervention, staff may be trained but it may be difficult to prevent them sharing their knowledge with colleagues in the control group. Controls also provide additional reassurance against any change being due to secular trends and thus strengthen inference over causal relationships. While randomized trials demand a contemporaneous control group, non-randomized designs do not. Control groups in general may therefore include historical controls, internal controls (within a system) or external controls (in a parallel system). Ideally, the intervention and controls should be similar in all relevant characteristics except for the exposure or intervention.

In some circumstances, it may not be possible to randomize and /or to have control group because of practical, ethical or political barriers. For example, quasi-experimental designs can be used to evaluate the impact of an intervention, which because of its wide acceptance among the users, is introduced simultaneously across an entire service unit (as it was the case in this PhD thesis). Two commonly mentioned quasi-experimental designs in the literature are controlled before and after designs and uncontrolled before and after designs. Before and after designs measure impact by comparing rates of the outcome of interest before the intervention is introduced and rates in the same community after it has received the intervention. Pre-intervention provides the baseline

data for benchmarking. The intervention period may last days to years. It is imperative to explicitly define this period and, ideally, to ensure that there is no contamination across periods. Any difference in performance is then assumed to be due the intervention. However, secular trends or other possible non-intervention changes make it difficult to conclude that there is a cause-effect relationship. This short-coming can be partly overcome by having a contemporaneous control group.

There are particular challenges of health service research in a complex and unique health system. First, it is often difficult to find a comparable control group which will experience the same secular trends and sudden changes as in the intervention group. Secondly, health system interventions may have a long, complex causal pathway that is influenced by a wide variety of factors affecting the target population's behaviour or their environment. The long causal pathway between intervention and effect means a pragmatic approach to studies in which contextual factors and effect modifiers arising as a result of learning during the process of evaluation must be appreciated as dynamic parts of any intervention (Craig, Dieppe et al. 2007). Thus, programme evaluation, a form of pragmatic study, is conducted in a predefined population with all subjects allocated to the intervention group and analyzed as intervention subjects whether or not they received the intervention. The estimated impact of the programme is then a combination of true efficacy of the interventions and the success with which they are delivered with evaluation likely to reflect effectiveness in a real world context (Eccles, Grimshaw et al. 2003). How much variation can be tolerated depends if one is interested in efficacy or effectiveness (Haynes 1999). A key question in evaluating a complex intervention is about practical effectiveness - whether the intervention works in everyday practice. To address the question if the programme will work in a 'setting like ours', the process and success of the intervention need to be described together with the demands on human and material

resources. Once effectiveness has been established, then interest can be shifted towards modalities of delivering it efficiently (Craig, Dieppe et al. 2007).

Thus, although regarded as the best form of evidence, some clinical trials are of little relevance to practising clinicians, administrative decision-makers or policy-makers (Tunis, Stryer et al. 2003). The choice of evaluation for a practice change intervention is further determined by who requires the results and what inferences will be made from the results. When implementation of action is required, then the 'how' it can be implemented becomes a pertinent question. In response to this debate and as a guide to researchers in public health or health systems, Habicht and Victora have classified inference into three categories: adequacy, plausibility or probability (Habicht, Victora et al. 1999).

Adequacy assessment: This answers the question, 'did the expected changes occur?' It is based on the comparison of the performance or impact of a project with previously established criteria. Adequacy performance evaluation focuses on project activities. For example, how many health workers are trained and how well are they trained? How many children are correctly assessed and treated using knowledge from the training? Impact evaluation assesses whether behavioural or health indicators among those in the project have improved. Both of these effects can be evaluated in cross-sectional designs or to assess trends repeated measurements can be taken in a longitudinal design. The adequacy evaluations do not use a control group and do not rule out outside influences such as secular trends. Though they do not provide strong evidence of cause-effect relationships, they provide necessary information that the expected goals are being met.

Plausibility assessment: Were there confounding factors to explain the changes? Plausibility assessment attempts to control for confounders by choosing a control group. However, no control completely eliminates confounders because the programme is

implemented in natural social, political and economical environments which the research team does not necessarily have control of. Plausibility of the findings becomes stronger by formally attempting to show that other alternative explanations are not likely. For example showing: i) congruency of expected trends in multiple areas, ii) changes are not due to secular trends, iii) lack of measurable confounders, iv) degree of change shows a dose response relationship, v) congruency of mediating variables, vi) congruency of lack of impact in the absence of intervention and, vii) congruency of magnitude of effect on mediating variables.

Probability assessment. How significant are the results? This is best addressed by experimental studies based on formal hypothesis testing.

Given these limitations of health research applying quantitative methods, Glasgow *et al* in support of an earlier proposal by Tunis (Tunis, Stryer et al. 2003) recommend a combination of qualitative and quantitative methods in-order to obtain information on the context, organizational culture and characteristics of the setting in which a programme is evaluated (Glasgow, Magid et al. 2005). The authors argue that the extent to which various interventions are delivered consistently and understanding barriers to implementation can provide valuable information for later dissemination efforts.

2.5.2 Qualitative studies

The discussion above should also make it clear that in attempting to answer 'how' an intervention is delivered, more qualitative insights are essential. Perhaps less clear, but also a consequence of the acknowledged interplay between the intervention and the setting in which it is delivered, is the notion that the intervention itself may not be of a fixed nature. Thus, a good intervention while retaining many fundamental aims or mechanisms may adapt to the context under study. Employing such an adaptive design

means lessons can be learned and used during the research about what works but even more important is the fact that the intervention process can be adequately described.

Sofaer raises several reasons for choosing qualitative methods (Sofaer 1999) : i) they provide a rich description of phenomena, including contextual factors and latent influences such as motivation, as well as helping to reveal which aspects of an intervention work well and which do not (Victora, P et al. 2004), ii) they allow for process evaluation by their ability to articulate the interventions and data for context and outcome. Process evaluation and non-interventional determinants related to the context cannot be studied with randomized designs. Thus, observational studies can be useful in generating hypothesis about which factors might be important determinants of performance (Rowe, Savigny et al. 2005), iii) they allow a developmental approach to inquiry and move inquiry towards more meaningful explanation, iv) they enhance the capacity to understand how and why the same events are interpreted in a different manner by different stakeholders, v) they are valuable in construction of theories that integrate understandings from multiple disciplinary roots and, iv) finally, they increase the ability to build a coherent body of knowledge and generate hypotheses.

In the next section, I will highlight literature on the value of participatory research, being the approach to qualitative research employed in this PhD thesis. I will outline the challenges of participatory research and the key differences between conventional research and participatory research.

2.5.2.1 Participatory Research

Participatory research (PR) has its origins in the community development movement in the low-income countries (Mc Taggart 1994). PR requires attention to power relationships, requiring power to be deliberately shared between the researcher and the researched. This research approach aims at getting people involved as researchers,

recognizing that people learn best and more willingly apply what they have learned when they do it themselves (Greenhalgh, Roberts et al. 2004). PR has a social dimension; the research takes place in 'real world' situations and aims to solve a problem. The change process potentially threatens all previously established ways of doing things, creating fear among the practitioners. There is the risk of bruising the participants' ego as a result of open discussions of their interpretations, ideas and judgments. Unlike in other disciplines, the researcher makes no attempt to remain objective but openly acknowledges their bias to the other participants. Each persons' ideas are, however, equally significant as potential resources for creating interpretative categories of analysis negotiated among the participants. Participatory methodologies are therefore reflexive, flexible and iterative.

PR focuses on generating knowledge for action unlike conventional health research which generates knowledge for understanding which may be independent of its use in planning and intervention. In PR the researcher studies the system and concurrently collaborates with members of the system in changing it in what is together regarded as a desirable direction. Unlike daily problem-solving, in PR the researcher studies the problem systematically and ensures that the intervention is informed by theoretical considerations, emphasizing scientific study.

In participatory action oriented research, theory informs practice and practice refines theory in a continuous transformation. Peoples' actions are based on implicit theories and hypotheses and with every observed result, theoretical knowledge is enhanced. The researchers therefore have to make explicit theoretical justification for their actions. PR is a formative research approach, with research methods being informed by ongoing experiences.

The researchers applying participatory approaches become learners, facilitators and agents of change in processes which develop their own momentum and the end result is determined by the people. However people who are ideally supposed to collaborate or have collegiate relationships with the researcher may have little or no confidence in what they know and look upon the researcher for guidance emphasizing the role of the researcher as facilitator. In the same vein, Kelly and Vlaenderen argue that with regard to needs assessment, people can only know what they lack to the extent that they know what alternatives exist. Capacity building may therefore be a prior requirement for a needs analysis. Kelly and Vlaenderen further argue that this needs analysis should not occur as a discreet and preliminary stage which is completed and then translated into strategies in participatory research (Kelly and Van Vlaenderen 1996). They propose that needs analysis should be conducted as a dialogue, taking into account the nature of possibilities, people's values and the resources available.

To prevent loss of confidence amongst the participating groups, Cornwall and Jewkes propose that the primary step should include creating spaces in which people can be empowered to engage in a process through which they can identify and confront their problems (Cornwall and Jewkes 1995). Capacity building may include enhancing skills like proposal writing, communication, workshop facilitation and other specific tasks required in achieving the overall objectives of the development process/research. The PR approach thus values peoples' own knowledge and regards them as agents rather than objects; capable of analyzing their own situation, developing feasible strategies to solve their problems taking into consideration the resources available, implementing potential solutions and monitoring the results.

Challenges in the participatory process

Participatory research (PR) has unique challenges and is not by any means easier than conventional research. In PR the researchers are visible, their intentions are transparent and they have to work with the people under study. These people may not be willing to invest their time and energy, especially if they perceive the study has little to offer in terms of direct benefit. PR also consumes time; the research groups fluctuate over time and even the support of the local leaders may wane away upon realizing they are not achieving what they anticipated. Thus, identifying honestly what can be achieved during the planning phase is important in establishing trust (Kirkpatrick 1990).

Participatory research is about realizing that local people are knowledgeable and that, together with the researcher, they can analyze their problems and develop feasible solutions. However, the training of medical researchers makes it hard for them to embrace this approach. They are taught to consider themselves and the western medical knowledge they have learned as superior and are often aligned with particular groups or institutions, which may result in suspicion (Kelly and Van Vlaenderen 1996). Therefore, researchers may neither be in a position to mediate conflicts of understanding and interest nor to promote a common vision. In addition, partners drawn from the local community may also carry their biases and beliefs into the research. Changing such mind-set may require substantial political and personality transformation (Cornwall and Jewkes 1995).

Conventional and participatory research therefore differ in terms of process and outcomes as tabulated in Table 1.

Table 1: Characteristics of conventional research compared with participatory research

| Characteristic | Conventional research | Participatory research |
|---|--|---|
| Purpose of research | For generation of knowledge with perhaps action later | For action; action is integrated in the processes |
| Identification of need | Researcher presents predetermined topic, community input is sought after objectives of study are already set. | Community helps identify the problem and solutions depending on the local context, resources available and priorities |
| Ownership of the research | Owned by the researcher or the funding agent. The researcher determines the momentum and the fate of the research. | Ownership shared with the local people. The local people determine the momentum and the fate of the research. |
| Definition of research goal and activities | The results are owned by the researcher and mainly emphasize the outcome. Data are collected, analyzed and interpreted by the researcher | The results are owned by both the researcher and the local people. Emphasis is mainly on the process. Data are collected, analyzed and interpreted by the local people. The researcher empowers the people to conduct these activities. |
| Presentation of results | Presented by the researcher to other academics or the funding agent | They are accessible and useful to the people |
| Mobilization of resources | Heavy external funding from external sources | May be both internal and external resources. |
| Indicators used for evaluation | The researcher determines the indicator. | Indicators are chosen with the local people |

There are unique implications in conducting research from the 'inside'. Coghlan and Casey have described the opportunities and challenges in doing nursing research in one's own hospital (Coghlan and Casey 2001). The researcher has knowledge of their hospital's everyday life and informal dynamics and is also able to see beyond the rhetoric of organizational objectives. They can also participate freely without undue attention to their role as researchers. However, the researcher may impose her/his prior assumptions

on the research, assuming they already know what is actually happening and therefore not probe as much as they would if they were outsiders. In action research the researchers also need to combine their research role with their regular organizational duties and this duality creates potential for role ambiguity and conflict. They therefore need to manage political dynamics which involve balancing the hospitals formal expectation from the research and their own expectations of the research project (Coghlan and Casey 2001).

2.5.3 Mixed method research

In the above sections, I have discussed the quantitative and qualitative research paradigms independently. In this section I will discuss the literature on mixing the two research paradigms in the same study, focussing on the benefits of mixing research methods.

The field of mixed methods research, also called the 'third methodological movement' has recently gained importance in health research (Teddle and Tashakkori 2003)pg 5). Creswell *et al* define mixed method studies as involving the collection or analysis of both quantitative and/or qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of data at one or more stages in the process of research (Plano Clark and Creswell 2008). Two other terminologies need to be clarified; mixed method design and multi-method design. Morse defines mixed methods design as that which is the incorporation of various qualitative or quantitative strategies within a single project that may have a qualitative or quantitative theoretical approach (Morse 2003). She further explains that the imported strategies are not normally part of the core design but are supplemental to the main method, and the supplemental and main data sets are mutually interdependent. In comparison, multi-

methods design is the conduct of two or more research methods, each conducted rigorously and complete in themselves in one project. The results are then integrated to form a comprehensive whole.

Mixed methods research evolved in recognition of the weaknesses of quantitative and qualitative research methods when they are applied independently, in a multi-methods style (O'Cathain, Murphy et al. 2007). O'Cathain *et al* argue that mixed methods studies can produce knowledge that is unavailable to other approaches through creation of a wider picture, more confidence in findings, an improved study component, a wider variety of view, a way of researching an issue that is otherwise impossible, or an understanding of why and where a study component failed (O'Cathain, Murphy et al. 2007).

The strategy for mixing the research methods must be explicit and justified in terms of the: i) sequence of methods (concurrent, quantitative first or qualitative first), ii) priority among methods (equal or either method prioritized), iii) stage in the research process at which integration occurs (formulating research question, data collection, analysis, or interpretation) and, iv) theoretical perspective (transformative or action oriented). Of these four factors, integration distinguishes mixed methods studies from a set of separate mono-methods studies. Integration provides unique insights or knowledge 'yield' as described by O'Cathain (O'Cathain, Murphy et al. 2007) (pg147) or an understanding which has been described by Barbour as the whole being greater than the sum of the parts (Barbour 1999). Based on the *gestalt* principle that the whole is bigger than the sum of its parts, some researchers argue that mixed method inferences are more transferable than the inferences of either the qualitative or quantitative component (Teddle and Tashakkori 2003). A common problem in mixed methods studies, nevertheless, is a lack of integration between the components, which limits the yield of insights generated

(O'Cathain, Murphy et al. 2007; O'Cathain, Murphy et al. 2010; Benning, Ghaleb et al. 2011; Lewin, Glenton et al. 2009) .

Mixed methods studies have been used successfully in health care research (Finucane and Mercer 2006; Leslie, Stallone et al. 2006; Snider, Kirst et al. 2010; Benning, Ghaleb et al. 2011), though most work has been conducted in primary care or in community settings, resulting in a dearth of mixed methods research in hospital clinical settings (O'Cathain, Murphy et al. 2007; O'Cathain, Murphy et al. 2010).

2.6 Conclusion

In this chapter, I have discussed the interventions aimed at changing professional practice and illustrated the evidence that interventions to promote uptake of guidelines recommendations produce modest, small or no effect. The chapter has examined the factors related to innovation, individual health professionals, organization structure and patients' environment that influence the implementation of interventions and touched on the important underlying concepts of structure, agency and power. The chapter has discussed measurements of quality of care illustrating the difficulty of interpreting outcome measures.

Finally, the chapter has reviewed design of studies of implementation research focusing on the designs used in this thesis. Challenges of conducting health research in a complex and unique health system are discussed suggesting the importance of understanding how the dynamic aspects of the context and organization of the institution might influence success and lead to a better understanding of the pathway to achieving success. Only by so doing can one understand how and why an implementation process has succeeded or has failed. Therefore, in the next chapter, I will describe the context in which the

intervention in this PhD thesis was introduced before discussing the study methods in chapter 4.

Chapter 3

Contextual Factors

In this chapter, I will describe the background of the study hospital focusing on the contextual factors which might influence ability of the hospital as an organization to adapt to the change. I define context as the environment and setting in which ETAT+ was introduced and which determined its implementation. The basic description of baseline contextual factors given below focuses on the internal environment with an emphasis on organizational structure and human resources relevant to service delivery for the sick child. I draw knowledge of contextual factors from archival data such as institutional strategic plans, hospital policies and my background knowledge that was further informed by interactions with key people in the KNH management and administration.

3.1 Historical background on Kenyatta National Hospital

Kenyatta National Hospital (KNH) was established in 1901 as the Native Civil Hospital with a two-ward facility. It has expanded over the years to a ten storey building that was completed in 1981 to enable the hospital to serve as a national referral and a university teaching hospital.

3.1.1 KNH as a referral hospital

KNH operated as a department of the Ministry of Health until 1978 when it became a State Corporation through Legal Notice No. 109. This mandated the hospital to act as a teaching and referral hospital and to; i) provide specialized health care, ii) provide facilities for training of health professionals, iii) do research and, iv) participate in national health planning and policy. Accordingly, KNH offers specialized services such as cardiothoracic surgery, neurosurgery, plastic and reconstructive surgery, orthopedic surgery and renal services including kidney transplantation. It also has well developed critical service units, namely intensive care, high dependency and newborn intensive care

units. The hospital offers quality specialized services to patients from Kenya and within the East and Central African regions.

Hospital capacity: KNH is the second largest hospital in Africa with a bed capacity of 1800, 225 of which are in the Amenity ward of a fully fledged Private wing. Linked to this, the hospital has 60 consultants' suites, at the Doctors Plaza, for hire by hospital consultants for their part-time private practice. Overall, the main hospital attends to 500,000 outpatients and 80,000 in-patients annually. The hospital attends to over 2000 inpatients daily.

There are 14,000 paediatric admissions annually. KNH has four general paediatric wards (serving children aged 0-11years); each with a capacity of 60 beds although the bed occupancy is often over 180% (source: Central Hospital Records).

Funding: KNH draws its funds from several sources namely the Government of Kenya (63%), development partners (4%) and internal sources namely cost sharing revenue (20%) and hospital enterprise services (13%). Though the government health facilities in Kenya should provide free treatment to children below five years of age, KNH charges all patients user fees. The mean cost to KNH per pneumonia in-patient care episode in the under 5's is estimated to be US\$117.14 of which 40% is recovered from payment of user fees by the caretakers (Ayieko, Akumu et al. 2009).

Source of KNH patients: KNH is located in Nairobi, the capital city of Kenya, which has a population of about 3 million people. There is no provincial hospital in Nairobi but there is a district hospital, which is less than half a kilometer from KNH. Within Nairobi there are 167 dispensaries, 68 health centers, 104 medical clinics and over 57 nursing homes /hospitals . There are only two government hospitals (one district hospital and one tertiary care hospital-KNH) that offer in-patient care to sick children. About 57% of

patients admitted in KNH with acute childhood illnesses are referred from private health facilities, 22% from public health clinics or dispensaries, 20% are direct self referrals and only 8% are referred from district or sub-district hospitals (Onyancha-Muma 2010). This suggests challenges in the referral system that have the potential of diverting KNH from its mandate of a tertiary care facility.

3.1.2 KNH as a university teaching hospital

The University of Nairobi (UoN) Medical School is located within Kenyatta National Hospital; it produced its first graduates in 1972. The vision of School of Medicine is to have a centre of excellence for the training of high-level skilled, disciplined manpower capable of providing evidence-based healthcare services in different resource settings, to engage in research and generation of new ideas, and the preservation and dissemination of knowledge.

The School of Medicine is headed by a Dean, who is answerable to the Principal of the College of Health Sciences. The Principal is answerable to the Vice Chancellor of UoN.

The School of Medicine offers undergraduate and postgraduate programmes with a spectrum from diploma to doctorate studies. On average 350 MBChB doctors and 20-35 paediatricians graduate from the UoN Medical School each year, among other specialists from other specialties. About 90% of the students are drawn from Kenya, while the rest are from the East African region and other African countries. The majority of medical students and paediatric trainees are now privately (self) sponsored. KNH also offers training to clinical officers, registered nurses and paramedics from the Kenya Medical Training College as well as private medical institutions.

3.2 Hospital vision, mission, and core values

KNH has a vision statement, as per the Strategic Plan 2005-2010, that is intended to give shape and direction to the hospital's functions and it forms the basis of the strategic planning process. The hospital's mission statement expresses its identity and purpose and promotes allocation of resources according to priorities. It has corporate values that aim at facilitating the staff to function within a set of common principles (Box 3.1).

Vision

'To be a regional center of excellence in the provision of innovative and specialized health care'

Mission

'To provide specialized quality health care, facilitate care, facilitate medical training, research and participate in national health planning and policy'.

Core value and guiding principle

- Worker is patient responsive and centered.
- Staff are the most valuable resource.
- Teamwork and co-operation, professionalism, integrity and ethics will always be upheld at the hospital.
- Dignity of the patient is the driving force behind all activities and services.
- Corporate social responsibility is an integral part of the hospital activities and services.
- The hospital is customer / client driven based on their required needs with a proactive and flexible approach.
- Adhere to principles of gender equity in decision-making and provision of services.
- Environmental friendly medical interventions are always encouraged.
- Hospital embraces the principles of effective practice, training and research for quality and effective healthcare services.
- The hospital encourages involvement of multidisciplinary teaching and learning in the hospital.
- Hospital focuses on quality, effective, affordable and accessible health services and training for Kenyans.

Motto

"Quality Health Care"

Source: KNH Strategic Plan 2005-2010

3.3 KNH organizational structure

The KNH Board of Management consists of eleven members. Among them is the hospital Chief Executive Officer (CEO), the Principal of College of Health and the Dean of the Medical School. The board is responsible for corporate governance issues. It advises on developing financial plans, corporate strategies, goals and objectives and has a role in evaluating management performance in pursuing and achieving these goals. There are five committees that assist the board achieve these objectives (Fig 3.1).

A CEO, who is a medical professional, is responsible for planning and day-to-day management. He heads the hospital and is answerable to the Board of Management.

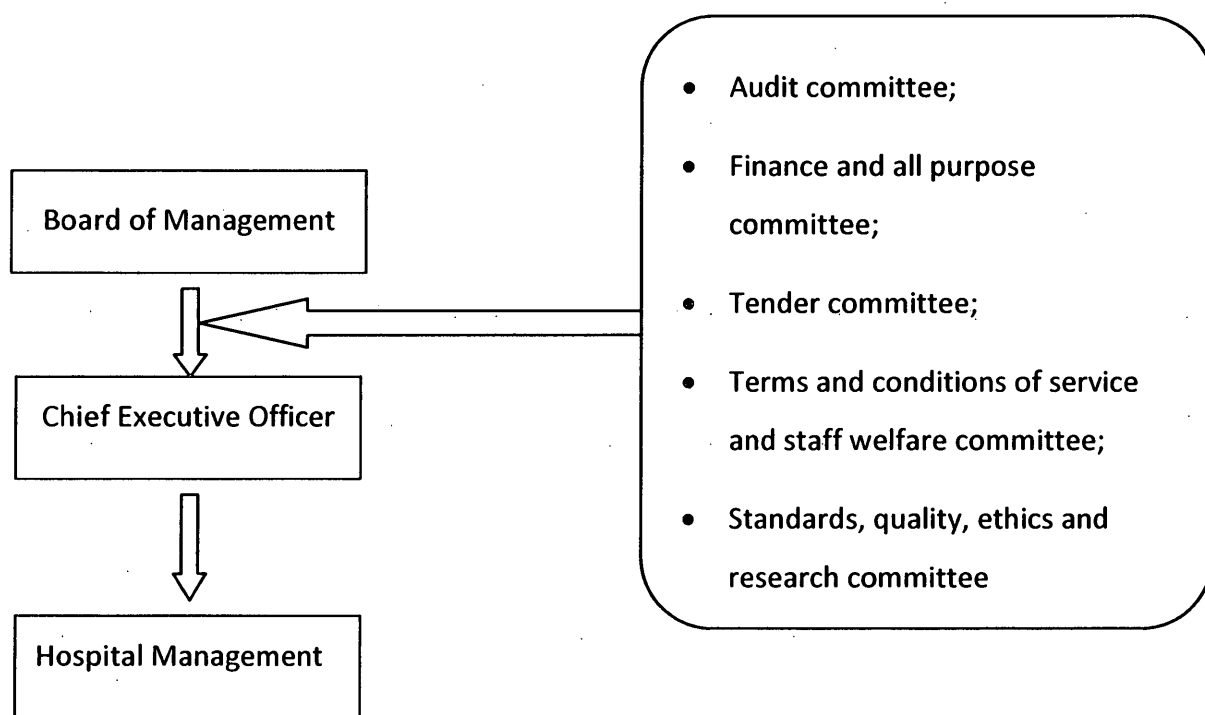


Fig 3.1: Relationship of KNH board of management and the hospital management

I identified three levels of agents that impacted, directly or indirectly, on the paediatric clinical service delivery unit and therefore influenced the activities carried out for the purpose of this PhD thesis. I categorize the agents as top-level management, mid-level

management and the front-line service providers. The levels overlap and are mutually interdependent.

Top-level management: The top-level management consists of the CEO, the Deputy Director (Clinical Services), the Chief Nurse, and the Dean and the Principal of College of Health Sciences, UoN. They were involved in policy development.

Midlevel management: For paediatric services, our unit of interest, the mid-level management consists of the KNH head of paediatric clinical services, the Chairman of the Department of Paediatrics in UoN, the head of paediatric nursing services, the nurse managers of the paediatric general wards and Paediatric Emergency Unit, the specific hospital administrator for the paediatric department and finally the paediatricians' in-charge (one from KNH and one from UoN) of each ward. The first three formed the link between the top-level management and the front-line service providers and facilitated operationalization of the policies developed by the top-level management. The KNH head of paediatric clinical services chaired the meetings for the mid-level management team. I identified myself with the mid-level management team and attended most of their meetings related to implementation of ETAT+ recommendations, on occasions chairing the meetings in the absence of the head of paediatric clinical services.

Front-line service providers: I categorized the health care providers who are involved in routine tasks such as admitting patients, conducting ward rounds and providing nursing care as front-line service providers. Some of the mid-level managers performed the tasks for front-line service providers too. Although the UoN team is referred to as an external stakeholder in the KNH strategic plans, it is in reality an integral part of the clinical service delivery unit and neither KNH nor UoN is independent of the other at this level. Thus, the KNH and UoN teams are both care providers for the seriously sick child and are referred

in this thesis collectively as hospital staff, while I use the term academics to refer specifically to paediatricians who are UoN employees and are members of the teaching faculty of the Department of Paediatrics. The latter are honorary consultants of KNH. Likewise the KNH consultants are honorary lecturers in the Department of Paediatrics, UoN.

To enhance teamwork in relation to training of doctors in Kenya, a memorandum of understanding (MoU) between University of Nairobi and KNH was developed in the eighties and was last revised in June 2000. This agreement listed the conditions each of the parties was supposed to fulfil to ensure smooth relationship between the two partners. In brief, the MoU provided guidance on collaboration of the two institutions. For example, representation of the KNH board in all university appointment committees and similarly representation of UoN in all KNH appointment committees for doctors. KNH was also required to establish a disciplinary committee composed of senior staff from UoN and KNH with jurisdiction over all the clinicians and post-graduate students. As a result of the MoU, a joint forum for the KNH and UoN paediatricians referred to as 'Division of Paediatrics' was also formed in the early eighties. The Division was headed by a senior member of the Department of Paediatrics, UoN, initially but since 2002 it was headed by a KNH paediatrician until it ceased to be functional in 2006. The Division channelled its problems through a Medical Advisory Committee (MAC) which in practice was the technical arm for KNH operations. The MAC ceased to exist in 2002.

Figure 3.2 shows the operational organizational structure of the paediatric clinical service delivery unit

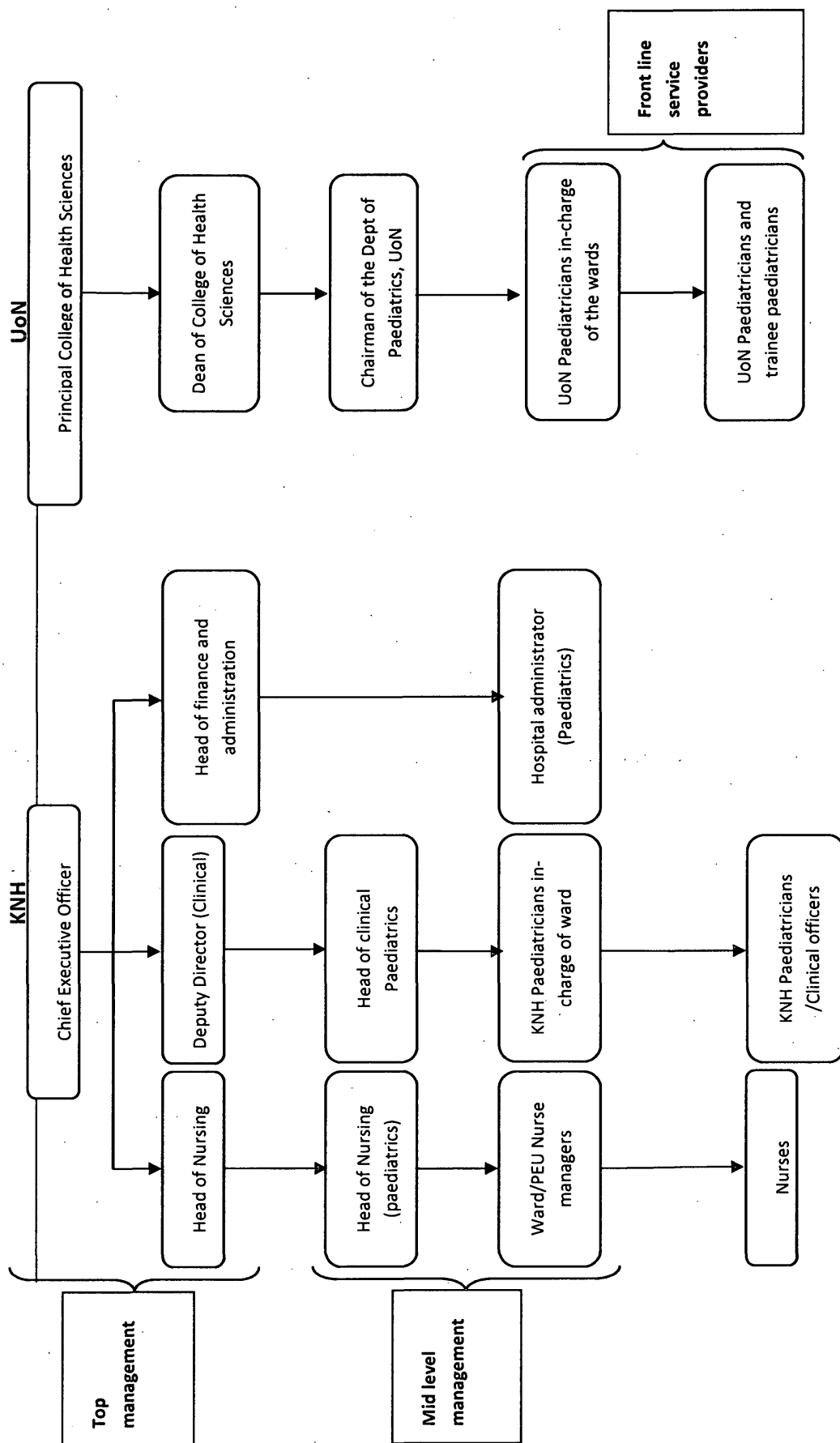


Fig 3.2: KNH and UoN organization structure in reality as observed during the study period by the PI for purpose of implementation of QoC initiatives

3.3.1 Clinical service delivery unit

The term 'clinical service delivery unit' is used in this study to describe practitioners who are the major players in delivery of clinical services to the acutely ill child in the first 48 hours of admission. The unit consists of clinicians and nurses who work in Paediatric Emergency Unit (PEU) and the four general paediatric wards. In total there were 25 paediatricians³ and 15 clinical officers (clinicians with a three-year diploma in clinical medicine) who provided services to the sick child in KNH supported by 8-10 medical officer interns. Of the 25 doctors, ten are KNH employees, of whom seven (out of 10) have a subspecialty. Fifteen of the paediatricians are University of Nairobi (UoN) employees and are lecturers in the Department of Paediatrics, UoN; all are either professors or have paediatric subspecialty such as cardiology, endocrinology, gastroenterology, nephrology and neurologist. Each ward is allocated 5-8 paediatricians, two of whom are KNH employees and the rest are UoN employees. PEU is supported by one KNH consultant during working hours, but at other times the duty ward consultant oversees activities in PEU. Each of the clinical officers (COs) have, in addition, completed higher a diploma in paediatrics. They are KNH employees and are responsible for attending patients in PEU, but bear no responsibilities for patients once they are admitted to the wards.

There are 60-75 trainee paediatricians enrolled in a three year postgraduate paediatrician training programme in UoN. They typically rotate three monthly through the paediatric wards and other departments such as renal unit and oncology wards relevant to their training. They are the backbone of the clinical in-patient care in KNH. Each of the four

³ In KNH the paediatricians who are KNH and UoN employees are referred to as consultants.

general paediatric wards has 6-8 trainee paediatricians and has a team leader coordinating their duties on the ward. All the four wards admit in turns with each ward admits every 4th day. Since March 2009, two trainee paediatricians from the admitting ward cover PEU on a 12 hour shift, supported by the COs and the PEU consultant or the ward consultant. The KNH clinicians are ultimately answerable to the KNH head of paediatric clinical services, while the academics and the trainee paediatricians are answerable to the Chairman of the Department Paediatrics, UoN.

There are 126 nurses who work in PEU and the wards. Each ward/PEU has 3-5 nurses per shift. The nurses work in shifts; 0730-1230hrs, 1230-1730hrs and 1730-0730hrs, the night shift is 14 hours because security considerations make night-time travel problematic. All the nurses are KNH employees. In addition, each ward is given funding for 21 hours per week for locum nurses. The nurses are answerable to the nurse managers in their respective wards who are answerable to the head of paediatric nursing, who is in turn answerable to the hospital Chief Nurse.

3.3.2 Background of the admitting unit

Until 2000, all the seriously sick short stay patients were admitted from Paediatric Filter Clinic (PFC, since 2008 called Paediatric Emergency Ward-PEU) to the Paediatric Emergency Ward (PEW). PEW had eight cubicles, each with a capacity of six beds (12 cots). Each of the four general wards was allocated two cubicles. The four wards admitted in turns, thus each ward admitted on every fourth day.

In PEW, all the seriously sick patients were admitted to a resuscitation or 'acute' room regardless of the ward they belonged to and were reviewed often by the trainee paediatrician on call and once or twice a day by the consultant who was on call. A system was in place for the trainee paediatrician's 'handing over' of the seriously sick patients to

their counterparts at the end of their shift. The other patients, not in the acute room, were reviewed daily by the trainee paediatricians and twice a week by the paediatricians. PEW was however overcrowded, handling up to 120 patients with a bed occupancy of over 300% and was not utilized as it was intended. Patients with chronic conditions were hospitalized in PEW for months as they 'waited for a bed' on the paediatric oncology or general wards. The general paediatric wards whose bed capacity is 60 beds then were reserved for patients with chronic illnesses. Two rooms with a capacity of one bed each were used as 'acute rooms' and were reserved for the seriously sick patient. PFC, each of the four units of PEW (corresponding to the four wards) and each of the four general paediatric wards had parallel clinical teams consisting of paediatricians, trainee paediatricians, MO interns and nurses.

When the PEW was closed in 2000, to allow KNH to realize its vision of being a referral hospital, patients had to be admitted directly from PFC to the general wards or through paediatric outpatient clinics for specialized disciplines. Thus, at the commencement of this study all patients who required inpatient care were attended at the PEU and admitted to the four general paediatric wards, each ward admitting every 4th day. No arrangements were made to increase the space reserved for the acutely ill children. In fact, the 48 PEW beds were 'lost out' to the non-paediatric service units. As a result, there could be as many as six patients in each of the tiny ward 'acute rooms', all occupying one bed while their caretakers sat on the benches. The number of nurses and the coverage by the trainee paediatricians did not change significantly. The trainee paediatricians continued to conduct daily ward rounds and the paediatricians conducted ward rounds twice a week. There was no system of handing over of the very sick patients at the end of the trainee paediatrician's shift. After 17.00hrs the trainee paediatrician and an MO intern on call reviewed the very sick patients upon the nurses' request, though in practice

after midnight MO interns usually attended new patients and old patients requiring doctor's review without supervision of a fully qualified clinician.

In-patient admission process: Sick children are received in the Paediatric Emergency Unit (PEU). Formal triage is done by a qualified nurse. Clinical officers are the primary clinicians in PEU supported by trainee paediatricians and a consultant paediatrician. Facilities at PEU are available for initiating emergency investigations such as blood sugar, blood slide for malaria parasites, haemoglobin level, oxygen saturation either by blood gas analysis or until recently by pulse oximeter, urea and electrolytes and lumbar puncture. Initial treatment including intravenous fluids is administered at PEU; thereafter the patients are admitted to the wards, clerked and reviewed by a MO intern and a trainee paediatrician who provided a management plan. Patients previously admitted to KNH are admitted first to the 'on-call' ward and transferred to their previous ward the following day. Each ward has a consultant 'on call' for 96 hours spanning the one admission day to the following admission day. The prescribed duty of the consultant on-call was to conduct post-admission ward rounds, which were in reality done on the day following the admission day.

3.4 Conclusion

KNH is a professional led organization having dual role of a tertiary care centre as well as an academic medical centre. The organization itself is complex with different professionals comprising the clinical service delivery unit complicated further by involvement of different institutions. This complexity underscores the understanding of historical contingencies, stakeholders' relationship as well inter-professional relationship that may influence implementation of an intervention in this context. Understanding the

context is also important in designing interventions to improve hospital care and health workers' performance. In the next chapter, I will describe the methods I used to evaluate impact of ETAT+ and provision of guidelines to the health workers and to explore why and how interventions work (or do not work.)

Chapter 4

Methodology

This chapter will explain why mixed methods research is an appropriate approach to answer the research questions posed. The chapter describes the before and after study used to evaluate the effect size of the intervention. This is followed by a detailed description of participant observation, the ethnographic method used to document the activities of the action research in this thesis. Interpretative description, the method of data analysis used in the qualitative research is also described. The chapter also describes the theoretical and philosophical framework adopted and their implications for the research findings. Finally, the chapter describes how the quantitative and qualitative results were integrated to produce stronger inferences.

4.1 Research aim

The overall aim of the study was to explore what influences uptake of best-practice recommendations in a university teaching hospital.

4.1.1 Principle research questions

What is the effect of ETAT+ training, the introduction of printed clinical practice guidelines (CPGs) and promotion of reinforcement activities on performance of health workers?

Why do the primary interventions (ETAT+ and CPGs linked to reinforcement activities) work or not work?

4.1.2 Objectives

The study sought to measure changes in the clinical practice of care provided for sick children admitted to KNH over the period 2005 to 2009. The year 2005 is the pre-intervention period while the year 2009 is the post-intervention period and the period (2006-2008) in between is the 'translation period'. Activities to reinforce the uptake of

the primary interventions were carried out from May 2008-December 2009 using a participatory approach.

Activities such as local goal setting, ongoing education, audit and feedback were introduced in an attempt to improve guidelines adherence. Given the complex nature of KNH and recognizing the value of local knowledge the precise nature of the reinforcement approach was not specified, rather it was intended that a participatory action research approach be taken to identify and implement acceptable components of the intervention.

Thus, the primary objectives are:

- i. To assess and evaluate the process of care against agreed, best-practice standards for children aged 2-59 months admitted in KNH with an admission diagnosis of pneumonia or diarrhoea/dehydration before and after the introduction of ETAT+ training, CPGs and reinforcement activities.
- ii. To assess and evaluate the process of care against agreed, best-practice standards for children aged 6-59 months admitted in KNH with an admission diagnosis of severe malnutrition before and after the introduction of ETAT+ training, CPGs and reinforcement activities.
- iii. To introduce through a participatory approach activities to enhance the value of training and use of CPGs in care of children admitted to KNH and to document the experience of and lessons learned from this process and identify facilitators of and barriers to uptake of ETAT+ recommendations in KNH.

4.2 Research methods

Having described the context in which the interventions were introduced in the previous chapter, I will now describe the research methods used to study the impact of the interventions. I will describe the overall research approach (mixed method research – section 4.2.1) and methods to explore how and why the intervention worked or did not work (qualitative research – section 4.2.2) and then describe the method to assess uptake of the intervention (quantitative research – section 4.2.3) and finally how the results of the two research paradigms were integrated (section 4.2.4).

4.2.1 Research approach - mixed methods research

This ethnographic study was a hospital-based, pragmatic study that utilized mixed methods research based on the theoretical perspective of participatory action research. The quantitative research was used to examine hypotheses with a focus on assessing the relation between interventions and uptake of best-practice recommendations. The qualitative research was explanatory with a strong emphasis on thick description of the phenomena and a thematic focus on the implementation process of best-practice recommendations and why the interventions worked (or did not work) (Morse and Field 1995).

The data collection from the two research methods was concurrent. Each data set was analysed within the parameters of its own paradigm. Integration of the qualitative and quantitative methods occurred within the research questions, at methodology level and at the point of theoretical interpretation (Fig 4.1). There was no intention to integrate the research methods within data collection at the design of this study. However, as the research progressed it became clear that the action research failed to generate regular

clinical audit reports (section 5.3.2) and as a result the preliminary results for quantitative data were used to give direction to the qualitative research.

The theoretical perspective of this study was based on action research and is reflected in the study objectives. It was the driving force for the methodological choices in this study such as defining the problem, selecting study design and data sources, analyzing, interpreting and reporting the results throughout the research process (Mc Taggart 1994; Waterman, Tillen et al. 2001).

Combining studies of quantitative outcomes with qualitative study of processes was intended to help in interpreting, justifying and illuminating the findings of the quantitative data. Specifically, it aimed to allow the dynamic aspects of how the context and organization of the institution might influence success to be understood and lead to a better understanding of the pathway to achieving success. It is hoped that providing such a detailed description of the context in which the intervention was applied (chapter 3) will help identify how interventions might be delivered in similar complex settings. In particular the descriptions of what worked and did not work, and reflections on the reasons for this, should provide insights into how institutions might promote uptake of best-practice recommendations.

Fig 4.1 illustrates the design of this mixed methods study. Integration of the research methods occurred at three levels: i) within the research questions ii) methodology; the preliminary results from quantitative research informed the activities in the qualitative research and, iii) theoretical interpretation.

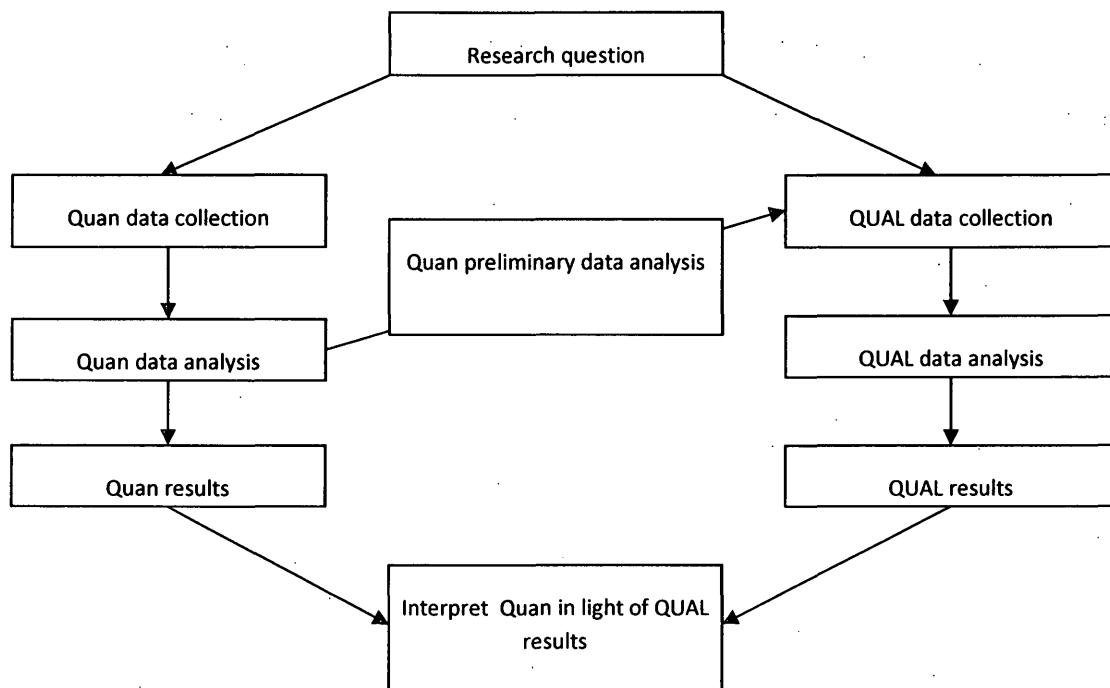


Fig 4.1: Visual presentation of research procedure⁴

4.2.2 Qualitative research

In this PHD thesis, the planned primary intervention in the before and after design is the ETAT+ training and provision of the CPGs. While the outcome study links the intervention with quantified outcomes, it does not explain the process by which the intervention was translated into that outcome. I used participatory action research (section 4.2.2.3) to test alternative implementation approaches, and examine ‘why’ the primary interventions worked or did not work, what problems or needs were identified and ‘how’ the emerging solutions were implemented to improve adherence to ETAT+ recommendations in the local context. My role in this action research was determined by the local context and my background knowledge and experiences. The latter was largely dictated by my prior experience working in KNH as a doctor and the relationships I brought to my new role as a researcher, my exposure to and belief in evidence-based medicine (EBM). I will describe

⁴ Higher case letter for QUAL implies qualitative research was the dominant research method.

my own situatedness that may have shaped the way I originally thought about and constructed the organizational and practice realities I imagined I would find in KNH. Therefore, in the course of this research, I needed to de-construct some of the assumptions I made when originally designing this PhD thesis. I will now describe my background and training (section 4.2.2.1) and my assumptions (section 4.2.2.2) before describing the actual methodology of the qualitative research.

4.2.2.1 My background training and roles

I saw myself as a permanent insider in the institution under study as illustrated below by roles and personal experiences. These experiences introduced diverse epistemological perspectives against which the observations in this study are appropriated, described and valued.

My training and experience working as a paediatrician and academic: I underwent undergraduate MBChB training (1983-1988) in the University of Nairobi (UoN) Medical School. I worked in KNH as a trainee paediatrician (1992-1996) in the Department of Paediatrics, UoN. I was employed by UoN as lecturer in the Department of Paediatrics and consequently appointed as an honorary consultant in KNH from 1996 to date. I taught Child Health (1996-2001) and I participated in the introduction of outpatient Integrated Management of Childhood Illnesses (IMCI) in the undergraduate curriculum. During this period my primary clinical duties were initially based in the Paediatric Emergency Ward (PEW) before being transferred to the general paediatric ward in 2000 when the PEW services were abolished (section 3.3.2). Since then, I had a chance of working in three of the four general paediatric wards in KNH as a ward consultant.

After sub-specializing in paediatric nephrology in 2001, I taught paediatric nephrology to undergraduate and postgraduate students. I also coordinated paediatric nephrology services in KNH being the only subspecialist in this field in the hospital at that time. The

nephrology patients were scattered in all the four general paediatric wards as well as other wards offering specialized paediatric services. During this period, I had a chance to interact closely with most of the front-line service providers in all the paediatric units.

In 2005, I was given the responsibility to coordinate mortality meetings⁵ as part of my UoN duties. Traditionally, the targeted audience for these meetings were trainee paediatricians and the academics. The trainee paediatricians collected the data on 'mortality and morbidity' for their respective wards while I collated, analysed and made a report. With time I invited the KNH staff to attend the audit meetings (about two years before commencement of my PhD study).

In mid 2007, I was given responsibilities to coordinate teaching of ETAT+ in the Department of Paediatrics (UoN) for both undergraduate and postgraduate programmes. I thus facilitated the clinical audits and hospital surveys conducted during ETAT+ training, which were followed by feedback and ETAT+ implementation plans. These feedback sessions targeted the ETAT+ course participants and the hospital management.

Prior exposure to evidence-based medicine (EBM): I had the opportunity to practice EBM in a highly efficient system in 2001, during my training in Paediatric Nephrology in Phoenix Children Hospital, Arizona. During this period, I appreciated that 'death should not be an expected outcome'. This created a desire to practice EBM. Later on, I participated in the development of MoH clinical practice guidelines (CPGs) and the training materials of the evidence-based ETAT+ course from 2005-2006 and directed several ETAT+ trainings in 2006-2007 (Irimu, Wamae et al. 2008) . This came with an obligation to read scientific articles that formed the basis of ETAT+ recommendations .

⁵ The term used for traditional unstructured clinical audit meeting held in KNH and UoN

These experiences boosted my ability to assess content specific attributes in this PhD research.

Prior experience in the facilitation of change: I was a supervisor and internal evaluator in the District Hospital Improvement Study (Ayieko, Ntoburi et al. 2011) from 2006 for a period of 18 months. My role was to advise two of the study hospitals on the process of implementation of best practices by giving audit and feedback and facilitating six-monthly problem-solving and action planning meetings. I also participated in rapid hospital assessment exercises in several hospitals, including KNH, under the auspices of the Ministry of Health (MoH) and KEMRI Wellcome Trust. Similarly during the process of scaling up ETAT+ trainings in the country, I facilitated several problem-solving and action planning sessions to help in ETAT+ implementation (English, Wamae et al. 2011). I had thus acquired a culture of consciously looking for facilitators to and barriers of uptake of ETAT+ recommendations.

Prior experiences in qualitative research: Prior to this PHD thesis, I had exposure in conducting research using mixed method design for my dissertation for my masters of paediatrics (Irimu, Nduati et al. 2008) and supervised a master's thesis that utilized a similar design (Owino, Irimu et al. 2009). I had also supervised master's theses on clinical audit based on observational methods (Nzioki, Irimu et al. 2009). These experiences enhanced my ability to assess interpersonal relationships during data gathering.

My role and experiences during the study period: During the period of the action research I continued with my duties in KNH and UoN but was exempted from nephrology related duties. I was thus a complete participant observer directly engaged with and immersed in the real life within the hospital but with a new focus on examining *why* and *how* events occurred. I also participated in and oversaw data collection for my ongoing quantitative

research. This helped me recognize some issues that needed further probing and gave me a sense of the degree of successful uptake of recommended practices.

4.2.2.2 My assumptions at the time of designing this research

In this section I will describe my personal assumptions and beliefs that guided this PhD thesis while simultaneously acknowledging how these might have originally biased my research and how, as a result, I found my thesis developing in a fashion that I had not anticipated when I started my studies.

KNH is a large teaching hospital and tertiary care hospital; I therefore assumed that it had established structures to allow assimilation of best-practice recommendations. For example, there was a KNH paediatrician in charge of continuous medical education (CME) sessions while another paediatrician coordinated research and clinical audit activities. There was a Quality Assurance Unit with full time staff comprising of one doctor and five nursing officers. Having already been involved in audits and feedback prior to commencement of this study, I felt that the audit and feedback which we sought to implement during this study were in some respects a continuation of my UoN duties. I believed that the feedback sessions made KNH staff identify me as an advocate for better clinical services for the acutely ill children. I assumed that my role as a researcher seeking to improve implementation of best-practices was a continuation in advocacy of better care for the sick child but would be more focussed, intensive and informed by theories. I counted on these prior experiences to strengthen the implementation process.

I assumed my main task during the study was to support and encourage the front-line service providers to give patients care consistent with the ETAT+ recommendations. With the majority of the consultants having undertaken the 5-day ETAT+ course, I counted on their support in reinforcing guideline implementation. By virtue of KNH being a teaching hospital, I imagined the junior health workers were likely to comply with what the

consultants advocated particularly for the trainee paediatricians who were assessed continuously as they worked on the wards.

Linking my assumptions to research methodology: Linked to the above issues, I planned to use the concepts of PRECEDE-PROCEED (P-P) health education model as the conceptual framework to guide and examine further the preferred interventions to improve the uptake of best-practices in KNH. This P-P model was developed by Green and Kreuter as a planning framework around which health education programs could be designed (Green, Kreuter et al. 1980). PRECEDE stands for *Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation*. The PRECEDE model posits that an education diagnosis should precede an intervention, just as a medical diagnosis precedes a treatment plan (Green, Kreuter et al. 1980). PROCEED which stands for *Policy, Regulatory, and Organization Constructs in Educational and Environmental Development* was latter added to the PRECEDE model. Overall the P-P model has nine phases for the planning, implementation and evaluation of health promotion programmes.

This model was adopted based on its perceived relevance to a tertiary hospital and medical training institution, my previous roles and *a priori* experiences in KNH and UoN. The P-P model directs initial attention to the output rather than input and allow incorporation of cycles of internal monitoring and evaluation linking audit and quality improvement approaches (Green, Kreuter et al. 1980). Thus, clinical audits that I anticipated would be conducted by the KNH staff themselves, would become learning experiences to inform continued actions to improve the uptake of ETAT+ recommendations.

Using an adapted PRECEDE-PROCEED health education model, I considered the predisposing, enabling and reinforcing factors that were likely to contribute to non-

adherence of CPGs and ETAT+ recommendations. How these were envisaged at the start of the study is now briefly discussed.

Predisposing factors: Care providers' knowledge, existing skills, values, attitudes, beliefs, personal preferences and self-efficacy towards desired change in practice were considered as key predisposing influences on their behaviour and practice (Green, Kreuter et al. 1980). I planned to influence this by creating awareness of the gap between current practices and expected practices, enhancing staff's knowledge and skills and by promoting ownership of the quality initiatives.

During UoN clinical audit sessions, which I conducted before this study, I attempted to create awareness that care delivered to children admitted in KNH fell short of expected WHO standards but there were no forthcoming solutions. I assumed this was due to lack of knowledge on the evidence-based practices. The idea of ETAT+ training therefore seemed good and the training methods involved were shown to improve uptake (Irimu, Wamae et al. 2008). Relevant regular educational sessions would prevent knowledge decline and promote uptake of the ETAT+ recommendations and also make those not trained aware of the ETAT+ principles. I appreciated how much I had learned through ETAT+. I compared how much I knew before I was involved in ETAT+ and how much I learned in ETAT+. I assumed most of the doctors were in the stage which I was in before and would therefore develop a passion for improving care if they too were ETAT+ trained.

During the educational sessions I hoped I would use the teaching materials used in ETAT+. This did not appear to be a big challenge considering that I assumed that a structure was in place to deliver CME sessions. In addition, there were several ETAT+ trainers among the trainee paediatricians who could facilitate the educational sessions.

Enabling factors: In line with Green and Kreuter's work, I defined enabling factors as psychological, emotional or physical factors in the local context that would facilitate motivation to change behaviour (Green, Kreuter et al. 1980). Enabling factors considered to increase motivation and self-efficacy in the context of this PhD research included i) skill enhancement e.g. using CPGs to aid in clinical decision-making, ii) the ability to identify problems and solution at all levels, iii) provision of basic resources that needed to be present to allow better practice, iv) better organization of service delivery and, v) authority given to the front-line service providers to do things differently.

I felt that I could bring about these enabling factors by training the staff to follow the principles of ETAT+, conduct clinical audit and feedback, debrief their colleagues, facilitate problem-solving and, plan for action. I thought audit and feedback would motivate staff to desire change in practice if I created awareness of the gaps between the current practice and the expected practice as recommended by ETAT+ recommendations. I drew my assumption from Kemmis's arguments that we may want to improve our self understandings, but also that our self understanding may be shaped by collective misunderstanding about the nature and the consequences of what we do (Kemmis 2001). I assumed the feedback would help the staff to develop a critical and self-critical understanding about the nature and the consequences of the practices we were engaged in. Nevertheless, I did not want to impose quality initiatives on the staff, rather I wanted to create a sense of ownership for the need to change practice and be involved in conducting audit, identifying problems and solutions.

I believed that actively engaging senior staff in audit exercises and planning sessions would encourage them to authorize the front-line service providers to do things differently in order to provide better care.

Reinforcing factors: I considered reinforcing factors as those that strengthen the motivation to perform the desired action (Green, Kreuter et al. 1980). These include factors that reward or reinforce the desired practice. I hoped to achieve this by facilitating dissemination of information on the uptake of the ETAT+ recommendations by audit and feedback. By making the staff aware of the progress of implementation of the quality initiatives and making their progress visible, I felt this would allow them to reflect on their progress and make them believe in their ability to bring change. I planned to accomplish this by involving staff in problem-solving and action planning sessions. I assumed that the feedback sessions for the audit report would also help to instil in the management and staff the importance of the improvement initiatives and that the new practices recommended in ETAT+ were evidence-based and therefore appropriate to follow. Similarly, the feedback would instil in the consultants the importance of supervision of the junior staff during ward rounds and inculcate a culture of quality care among the junior staff.

With these assumptions in mind, I designed a participatory action oriented research that I describe below. The methodology was intended to be flexible and driven by the interests and values of the staff. I felt it was important to remain open to the widest possible range of findings, including the possibility that my initial ideas and plans might be inappropriate or mistaken (Jorgensen 1989).

4.2.2.3 Participatory action research

Participatory action research (PAR) is an approach intended to improve social practice by changing it and learning from the consequences of change; this is analogous to improving

clinical care in the context of this PhD thesis. PAR encompasses two methodologies; participatory research and action research. PAR builds on the action research and group dynamics model developed by social psychologist Kurt Lewin in the 1940's. Lewin described action research as proceeding in a spiral of steps, each of which is composed of planning, acting, observing, and evaluating the result of the action. The process begins with an idea that some change or improvement is desirable. The group then identifies and works on the priority problems that members perceive as of mutual concern (Mc Taggart 1997). The fundamental feature of action research is group decision and commitment to improvement (Mc Taggart 1994). Waterman et al in a systemic review of action research in health care gives an overarching definition that incorporates the participatory nature of PAR adding that the participatory process is educative and empowering, involving a dynamic approach in which problem identification, planning, action and evaluation are interlinked (Waterman, Tillen et al. 2001). I argue that the Lewinian approach fitted this PhD thesis because the cyclic nature recognized the need for action plans to be flexible and responsive. In addition, the overlap of action and reflection steps allowed changes in plans for action as people learn from their own experiences. Given the complexity of KNH, in reality it is never possible to anticipate everything that needs to be done.

Regarding participation in research, Mc Taggart argues that authentic participation means sharing the way research is conceptualized, practiced and brought to bear on the life-world (Mc Taggart 1997). He adds that distinctions must be made between 'participation' and 'involvement' (pg 28). This PhD study aimed at a collaborative process seeking the participation of the hospital and university staff and myself. The strategies to improve performance were determined by the staff based on their priorities and the available resources. No external funds were availed for this process; rather the hospital financed the activities. The momentum of this PAR was determined by the overall coordinated

function of the three parties. In line with the nature of the participatory action process, the implementation process was iterative; as problems were redefined with subsequent development and testing of supposedly feasible solutions evolved.

Philosophical framework of participatory action research: In this section I will discuss why the philosophical notions that appear to influence PAR in health care, which are critical, participative and qualitative, were relevant to my thesis. Action research is informed by critical theory, dialectics, hermeneutics, praxis and phenomenology (Waterman, Tillen et al. 2001). It aims at democratizing institutionalization of research by including and encouraging those who are normally excluded from the process of informing it. Practice including research is socially, historically and discursively constituted. Waterman *et al* argue that drawing from hermeneutical ideas, practice is a reflective exercise underpinned by meaning, values and intentions that are continually informed and re-informed by both practitioners and the organization in which they take part (Waterman, Tillen et al. 2001). In PAR primacy is given to the search for experiential, spiritual and practical knowledge by the group. Group and individual reflection allows practitioners to engage deeply with experience and practice (Kemmis 2001). I argue that this approach is highly relevant to my thesis as my aim was to gain a greater understanding of the KNH context, not only from the perspectives of my colleagues but also from my own perspective as a researcher and not just as a practitioner. In this way, therefore, support some change in my colleagues' understanding of their beliefs, attitudes and practices.

Willmott argues that hierarchy operates to exclude subordinate agents in the decision-making process, thereby depriving them of full involvement in the institutions through which their sense of identity and purpose is constituted. He further argues that irresponsibility and apathy ascribed to employees may be addressed by wider diffusion of

power and responsibility through democratization of the institution, rather than strengthening control and rewards (Willmott 2005). In this PhD thesis, in a complex environment, PAR was relevant for showing a commitment to democratic principles. In addition, given the fact that KNH is an organization host to multiple professional groups, PAR gave the professionals primary responsibility for deciding the course of critically informed action and engaged them in evaluating the results of strategies tried out.

Why I chose participatory action research. The strength of choosing PAR for me was because I wanted a research process that allowed any outcomes to be meaningful to the staff themselves by grounding them in the reality of their everyday practices. In other words, a process that would engage all staff in examining their knowledge (understanding, skills and values), interpretations of their actions and improving quality informed by theoretical considerations. Thus I wanted to engage the hospital staff as researchers because this approach helped me to appreciate that people learn best and are more willingly to apply changes when they learn by doing things themselves (Greenhalgh, Roberts et al. 2004). I wanted to draw on the expertise and the experience of the professionals and use the diversity of these qualities as strength in improving the institution. Kemmis and Mc Taggart argue that through PAR people come to understand that (and how) their practices are located in and are the product of historical circumstances that produced them and are in turn reproduced in daily routines. This knowledge may illuminate how it may be possible to transform practices (Kemmis and McTaggart 2005).

PAR, and especially its reflexive aspects, also provided an experiential learning opportunity for the researched and myself and the models of learning were context-bound. PAR recognizes that individuals learn to the extent that they expose their needs, values and behaviour patterns so that perceptions and reactions can be exchanged (Kolb

1984). The Lewinian model of action research posits that immediate personal experience is the focal point for learning, giving subjective personal meaning to abstract concepts and emphasizing on 'here and now' concrete experiences to validate and test abstract concepts. The nature of the strategies to improve uptake of ETAT+ recommendations emerged through a collaborative method that allowed joint learning about what might work (or not work). A PAR approach appeared to work well because it was flexible enough to respond to contextual factors and was adaptable to any unanticipated barriers or developments. PAR approach also fits with qualitative and mixed methods notions, which are based on the suggestion that findings from a purely positivist stance may not provide a broad enough picture of the situations being studied. Thus, make it more difficult to find the appropriate solutions to practical problems experienced by members of an organization (Waterman, Tillen et al. 2001). Waterman *et al* emphasize the importance of involvement, qualitative research methods and the generation of local understandings and evaluation of practices that have clear benefits for those involved (Waterman, Tillen et al. 2001). From their perspective, having no prior knowledge makes it impossible to gain new knowledge, which supports the idea that one's understanding is constantly reconfigured as one moves from the particular to the general and back again and from one person to another and back again. I argue that the reflexive nature of this PhD thesis allowed the researcher and the researched to understand the reasons behind the care-providers' actions including examination of their intent, values and ethics.

Participant observation, based on traditional ethnographic research methodology, allowed a more contextualised description of the implementation process and the alternative approaches to achieving effects through PAR. This is the focus of the next section.

4.2.2.4 Ethnography

Ethnography evolved from cultural anthropology. Ethnography is small scale research carried out in everyday settings, using several methods. The process of ethnography lends itself well to a mixed methods approach because the research design evolves throughout the study and allows the researcher to focus on the meaning of individuals' actions and explanations as well as collecting quantitative data to build a broader picture of what appears to be going on. Ethnography accepts the organic and generative nature of research and provides the researcher with the possibility to reconfigure the boundary of a problem and to suggest new ways to address old and intractable problems (Lambert and McKeivitt 2002). In addition, ethnography is contextual and reflexive: it emphasizes the importance of context in understanding events and meanings and takes into account the effects of the researcher and the research strategy on the findings (Savage 2000). Ethnographic studies have been used in health research where the researcher's aim is to build up an in-depth picture of the phenomena under study which strives to make sense to those being studied but which allows, along with other qualitative approaches, for the inductive development of more general theories (Nugus and Braithwaite 2010; Nugus, Carrol et al. 2010; Nugus and Forero 2011).

Focussed ethnography: This hospital-based PhD study utilized focussed ethnography. This is context bound ethnography used in health research primarily to improve practice. It differs from classical ethnography described in some aspects (Morse and Field 1995). In this PhD study the topic was selected before data collection commenced, unlike in classical ethnography where the topic emerges during data collection and analysis. The participants in this PhD study are linked to the paediatric service delivery unit within KNH rather than a place of residence; they may not be connected by the same culture (in its

broadest sense). However they share behavioural norms and a common language emanating from their medical background.

As I have argued above, participant observation based on traditional ethnographic research methodology allowed a more in-depth description of the implementation process of the alternative approaches introduced through action research, which would have been more difficult to access from a purely quantitative perspective. Moreover, the generative nature of ethnography provided me with an opportunity to re-think any assumptions I had at the start of the project.

4.2.2.5 Participant observation

Participant observation (PO) has its roots in anthropology. It is the research strategy commonly employed by ethnographers. Traditional PO consists of a single researcher spending an extended period (at least a year) living among people he or she is studying, participating in their daily lives in order to gain as complete an understanding as possible of their cultural meanings and social structures and how these are interrelated (Davies 1999). Depending on the acceptance of the people studied, a researcher can adopt one of the possible roles: complete participant, participant observer, observer as participant and complete observer (Davies 1999).

Being a member of this community I took participatory roles in different capacities; as a consultant paediatrician, academic, ETAT+ trainer and as a researcher. This allowed me to gain some understanding of the management and the health workers' world of meaning and actions. As a researcher, PO meant not only 'being there' and observing the situation, but also being in a position to participate with my colleagues in an action orientated way. My involvement was overt. I involved key people in KNH and UoN in this research as co-researchers; I discussed with them the proposal and they subsequently reviewed the final proposal. The proposal was also shared with KNH and UoN staff in two open seminars.

Permission to carry out this research was granted by KNH Ethical Review Committee (Appendix 1).

Previously participant observation has been used in hospital based research mainly to study care providers workflow (Zhu, Weiland et al. 2008; Brixey, Robinson et al. 2010; Weigl, Muller et al. 2011), most studies employ non-participant observation (Benning, Ghaleb et al. 2011). In the following section, I will provide an account on why I choose participant observation in this PhD thesis.

Why I choose PO. I will argue that PO provided a direct experiential and observational access to the participants' world of meaning (Jorgensen 1989). It provided me with a lens through which to view the wider context in which behaviour took place. Social realities are constructed by participants in those situations; and those acts can only be understood through interpretation. Thus, Hatch and Dvora argue that knowledge is context specific and created for that situation (Hatch and Yanow 2003). Morse, in support of PO argues that other approaches that are not developed to understand group culture, for example, focus group discussions are not a substitute for observation because they do not allow for consideration of context within which individual attitudes and values have developed (Morse and Field 1995).

PO allowed the process of change to be carefully studied as strategies evolved rather than relying on purely retrospective accounts. I observed real-life situations; the staff described processes in real-time as they engaged in them.

PO allowed me to understand aspects of the setting that the participants may have wished to hide from me, either deliberately or unintentionally. In addition, this approach allowed me to explore the participants' description alongside my quantitative data and thus, to recognise that my role as a participant observer was to explore why my

colleagues might want to portray themselves in a particular light to me rather than, as in quantitative research, consider their stories were systematic distortions of the facts. In support of PO, Sobo argues that words cannot be taken at face value, and hidden meanings of words sometimes only emerge when we observe speakers' actions in their context (Sobo 2009).

Formal interviews tend to produce orthodox responses. Lambert and Christopher argue that these interviews fail to distinguish between normative statement (what people ought to do), narrative reconstruction (biographically specific reinterpretation of what happened in the past) and actual practice (what really happens) (Lambert and McKevitt 2002). PO in this PhD research ensured awareness of these distinctions by situating their narratives within the broader context of a person's practice as well as KNH as an institution. In addition, PO allowed me to access subliminal and subconscious forms of knowledge expressed as behaviours that resist and defy linguistic translation.

On-site conversations allowed 'a special short cut to develop trust' (Sobo 2009)(pg 211). In addition, PO allowed me to hear my colleagues' private and public narratives, for example gossip and unguarded remarks, which may be omitted from more formal interviews. Given my shifting roles in the clinical context, it would have been difficult for me to have used formal interviews such as focus groups because the participants had learned what I advocated for or against during audit-feedback and problem-solving session and the educational sessions. Instead I used conversations to obtain any information that I thought was necessary.

Conducting participant observation: In this sub-section I will describe PO as applied in this PhD thesis. However, to supplement my observations I held opportunistic

conversations with the staff and also obtained information from secondary data. I also kept a field diary as a repository for my observations, memories and reflections.

Direct observations: I carried out observations during and as a part of my routine work as a ward consultant, academic and as a researcher in action research. Selecting what I should observe depended on opportunity and my personal research interests, including opportunities to test out theoretical models. Ward rounds, audit and feedback sessions, and educational meetings helped me to identify the problems I needed to explore. The precisely defined quality indicators (Appendix 2a-c) made my observations more focused. I used snowball procedures to explore the root cause of the problems, that is, for each problem identified I attempted to understand what caused the problem, then what was underlying the problem and so on. I found the use of process maps helpful in chain-linking issues.

Conversations and inquiries: Most of the inquiries were on-going during the PO, as questions arose from the situations that I found myself in. The process of inquiry was open-ended, opportunistic, flexible and required constant redefinition of the problems, based on facts gathered in the context in which clinical care was provided and reflection. This helped to direct my questions towards the areas I felt I needed to explore in my research. I told those I observed or spoke with that I wanted to gain an understanding of why people do the things the way they do and to facilitate development of educational sessions that would be meaningful to staff. I tried to overcome their anxieties about them not having anything useful to say by reassuring them that their opinions were very important to my study. If information was new to me I would restate what a person said seeking to overcome any assumptions I had and to understand more about the way things were done, particularly when I had expected practices to be done differently. In cases where I felt that the information would lead to obvious non-conformity with best-

practice recommendations, I would seek the participants' recommendations of what they felt should be done differently. I aimed at making them feel that these were common problems and that we needed to develop sensitive approaches to address the difficulties through educational sessions or other channels. As a researcher who was a permanent insider and having diverse roles, I could use internal jargon and draw on my experience while speaking to colleagues, as well as following up on their replies to enable me to collect rich data.

My conversations with participants were not hurried, and lasted as long as the participants' duties allowed, or felt comfortable with, but sometimes required following similar issues at different times when the staff were less busy. The conversations moved from the general and progressively focussed on specifics. My explorations took place anywhere any time; by the patient's bedside, nurses' desk, along the corridors, in the offices, over a cup of tea and so forth.

I also held lengthy and regular conversations with key people in UoN and KNH to better understand any issues regarding KNH organizational structures. These conversations also helped to fill in gaps in the data that emerged through ongoing analysis, to explore the participants' thoughts, meaning and ideas and to validate the model I had developed.

Secondary data: During my interaction with staff and the management I collected or photocopied any of the KNH policy documents relevant to my research such as the KNH strategic Plan 2005-2010, Hospital Charter 2007, Revised Schemes of Service for Health Personnel (Republic of Kenya, 2004, used by KNH Human Resource Department for reference) and Memorandum of Understanding between KNH and UoN. I also kept minutes of ETAT+ related meetings held within KNH during the period of action research.

Field diary: I kept a diary of events including direct observations, conversations, experiences and insights reported by KNH staff I interacted with over the period from May 2008 to December 2009; all recorded anecdotally with a focus on implementation of ETAT+ recommendations. As a participant observer it was neither practical to audio-tape nor record the diary in real-time as this I believe would have inhibited my colleagues. Thus, I made rapid field notes, just key words and abbreviations only comprehensible to myself. I feared that writing detailed notes in front of my colleagues would have negatively affected the relationship I had created with them so I preferred to write my field notes up at the end of the day. In addition, as a way of recording my observations, I took still photographs of scenes I considered relevant to my study such as treatment sheets, patients notes, and oxygen delivery systems. This was always done with prior permission from my colleagues or parents if it was necessary, ensuring that the patients and health-workers identity were obscured. I expanded the field notes into proper diary entries and made notes regarding the photographs every evening. Consequently, in this thesis I have no verbatim quotes, rather what I have are excerpts from my field diary representing my recollection of observations.

To enhance in-depth reflection of the observations, I wrote a narrative objective description of events as observed on one side of the diary and then accounts that included the perspectives of those observed and my perspectives and interpretation of the observations on the other side.

Reflexivity: This study aimed to be reflexive because the researcher was part of the social world studied. Davies argues that the relationship between ethnographer and informants, which forms the basis of subsequent theorizing and conclusion, is expressed through social interaction in which the ethnographer participates. Thus, ethnographers help to construct the observations that become their data (Davies 1999). He adds that doing

research means increasing understanding, with varying constructions of reality, including the ethnographers' own construction.

In this PhD thesis I had a dual role; as a clinician and a researcher. Such an approach casts the clinician as both subject and object of research, at different moments, by adopting and alternating between contrasting attitudes of the practitioner and critical and self critical observer of her or his own practice (Kemmis 2001). I was a consultant studying other consultants, trainee paediatricians and other health workers, most of whom I have worked with for a long time. I had diverse roles depending on who I was interacting with and the particular activities I was under-taking. Often I wrestled with my role as a consultant, academic and a researcher conducting an action oriented ethnographic study.

During the period of field work I abandoned my office in KNH and spent most of the time while not in the hospital at KEMRI Wellcome Trust Programme offices⁶. This helped me to re-establish myself as a researcher. Discussing with my supervisor (ME who is a paediatrician and a researcher) and my sociologist colleagues helped me reflect critically on my construction of reality. These discussions challenged my epistemological assumptions, heightened awareness of my own subjectivity and helped me reflect about my words and interpretation from someone else's perspective. The discussions also helped me question perspectives of the observed rather than taking them as the truth. The reflexive diary also helped me to reflect on etic (meant to be universally applicable, they are imposed from outside onto the culture under study) and emic (insider perspective) considerations (Sobo 2009). I also used end of week reviews to reflect on anything I should have done differently to inform work progressively.

⁶ KEMRI Wellcome Trust Research Programme was the sponsor of my PhD programme and two of my supervisors were affiliated to this institution.

During audit, feedback and problem-solving meetings and during CMEs I explicitly and deliberately allowed the participants to consciously reflect on my interpretive insights to enhance reflexivity. In addition, I discussed my results and my insights with key individuals, for example the mid-level managers. This was possible because of the action oriented participatory research. I also presented the study results to senior members of the department of paediatrics, UoN and also to the KNH Senior Management Committee. In the presentations, I included still photographs of what I had observed and presented my constructs to determine if my interpretation was credible to the staff, who I considered to have expert knowledge.

In conclusion, I will argue that an ethnographic approach, and in particular PO, allowed me to immerse in my diverse roles and in the process had access to staff and provided glimpse of what Geertz describe as thick description (Geertz 2003) of the phenomena under study. Full descriptions of my accounts are in chapters 5 and 6.

4.2.2.6 Data Analysis

I adopted an interpretive descriptive approach to understand the strategies that were identified by the staff and myself to improve the uptake of ETAT+ recommendations and the learning gained from examining how they evolved. I choose this approach because I wanted a method with intellectual rigor, coherence and validity within qualitative research and that generates findings that can be effectively and realistically synthesized and applied by health care-providers with value in advancing research and theory.

Before adopting the interpretive descriptive approach, I first considered grounded theory because it is commonly used in analysing qualitative studies in health research. It was however not appropriate for my data. First, this PhD study was an observational study and the field notes were my observations written in my language while the conversations were recorded in abbreviated format and expanded later. With a focussed ethnographic

study, it was difficult to eliminate insight when expanding the field notes, besides some of the vocabularies originated from me. Change in words or simply failing to record an observation may affect the coding. In ethnographic studies the researcher makes choices of what to register and what to leave out (Schensul, Schensul et al. 1999). In addition it is the way that observations are recorded that subjects them to further exploration. Secondly, PO yielded rich data with a lot of details on mundane events such that coding too meticulously, as required in grounded theory, proved to be too confining for this type of ethnographic research. During the fieldwork I used line-by-line coding in order to refocus observations and conversations. However, throughout the final analysis I opted for incident-by-incident coding. I found this useful in discovering patterns and contrasts. I found axial coding cumbersome and it limited the codes I constructed. This study is not an exception, Barbour also notes that few published papers yield the surprises likely to be a feature of analysis driven entirely by respondent's concerns adding that some researchers use grounded theory to confer academic respectability (Barbour 2001). However the literature on grounded theory provided background, principles and rules for my thesis rather than providing a step-by-step guide to structure and analysis of my study. This was consistent with Hunter *et al*'s argument that grounded theory is diverse in its application and can be modified and applied to suit the nature of the problem and the particular research style of the investigator (Hunter, Hari et al. 2005). I will now describe interpretative description as applied in this thesis.

Interpretive description: Interpretive description is a relatively new qualitative methodology that aims at generating knowledge relevant for the clinical context of applied health disciplines (Thorne, Kirrkham et al. 1997; Lopez and Willis 2004; Thorne, Kirrkham et al. 2004; Hunt 2009). Interpretive description is a non-categorical methodological approach that attempts to address complex experiential questions that

are relevant to applied health disciplines, but which are not readily answered by traditional qualitative methodologies (Thorne, Kirrkham et al. 1997; Thorne, Kirrkham et al. 2004). The design strategies in interpretive description 'borrow strongly from some aspects of grounded theory, naturalistic inquiry, and ethnography, drawing on values associated with phenomenological approaches inherent in the methods of data collection' (Thorne, Kirrkham et al. 2004) (pg 6).

Philosophical framework of interpretive description: The philosophy underlying interpretive description is aligned with interpretative naturalistic orientation that acknowledges the constructed and contextual nature of human experience and at the same time allows for shared realities (Thorne, Kirrkham et al. 1997). Thorne describes three philosophical features underpinning this research design (Thorne, Kirrkham et al. 2004). First, there are multiple constructed realities that can be studied only holistically. Thus reality is complex, contextual, constructed and ultimately subjective. Secondly, the inquirer and the object of inquiry interact to influence one another; indeed, the knower and the known are inseparable. Lopez and Willis argue that the meanings that the researcher arrives at in interpretive research are a blend of the meanings articulated by both the participants and the researcher within the focus of the study (Lopez and Willis 2004). Thirdly, no a priori theory can possibly encompass the multiple realities that are likely to be encountered; theory must emerge and be grounded in the data.

Interpretive description presumes that there will be some theoretical knowledge, clinical pattern of observations and scientific basis within which all studies of human health and illness phenomena are generated (Thorne, Kirrkham et al. 2004). The researcher draws on prior knowledge that has grown out of experience, education, training and personality. These constitute the lived experience, which in turn shapes the way we understand our selves and the world within which we live (Hatch and Yanow 2003). Data collection and

coding inform one another iteratively and thus shape and direct the data collection as new possibilities arise and are considered.

The intellectual task of the analyst is to engage in a dialect between theory and data, avoiding theoretical imposition on one hand and atheoretical description on the other hand, in the quest for a coherent rich interpretation that allows a prior theory to be changed by the logic of the data. In contrast to grounded theory, interpretive description is not used to generate hypotheses to be tested. Instead a theoretical approach can be used in making decisions on research questions and theoretical sampling (Lopez and Willis 2004; Thorne, Kirrkham et al. 2004).

In this PhD study, I had knowledge on the ETAT+ recommendations and being a member of this institution I had assumptions why interventions would work. My *a priori* assumptions (section 4.2.2.2) were largely proved wrong and this persuaded me to bracket my assumptions and let the theories emerging be grounded on the data.

Process of data analysis: The process of data analysis was ongoing during data collection for the purpose of theoretical sampling. After completion of the action research, qualitative data were analysed afresh because I realised I had gained a deeper more holistic understanding and interpretation of the phenomena under study.

I will describe the inductive analytic approach undertaken under two major activities: i) immersion in the data and coding and ii) category and concept development. Theoretical interpretation of the integrated data (quantitative and qualitative data sets) will be discussed in section 4.3.

Immersion in the data and coding: Understanding data and obtaining a whole sense was gained by repeatedly reading all the data to achieve immersion. I then entered the handwritten notes in the field diary in matrices in Microsoft Office Word employing the

following structure - date of observation/entry, planning and my role, arising issues, staff perception, my reflection and issues requiring further investigation / proof. With study objectives and emerging issues in mind I re-read the data word by word, highlighting chunks of text that answered the key questions. I then coded the data manually focusing on incident coding (Charmaz 2006). I wrote key words (key phrases) in the text on the right hand margin of the transcript. Then I listed all the key words and developed shorter code phrases that captured the main idea of what was observed or what the staff said. Similar code phrases were then grouped together. These codes were verified by my supervisor (ME) who is engaged in implementation research and an honorary consultant paediatrician in KNH. The definition of these codes evolved inductively. The codes changed and their definition also became clearer and tighter as the coding process progressed. I constantly explored questions such as: 'What is happening here? Why is this happening? Why not something else? What do I know about this? How do I know what I know? What does it mean to the health worker? What does it mean to the organization? What does it mean to the patient? What is the dialectal relationship between what the data are telling me and what I want to know?'

Category and concept development: I explored the codes using the constant comparison technique for comparing why people behaved the way they did compared to other ways of carrying out the same task. From this process, I identified the underlying uniformity of the coded phrases to produce concepts. The concepts were then compared with more empirical indicators and with each other to sharpen the definition of the concept and define its properties. Secondary data such as KNH policy and official documents, Ministry of Health policies and relevant WHO recommendations were analysed to increase the breadth of inquiry and as sources for comparative analysis. Additional conversations were held with key people from management to clarify discordant information. Similar

concepts were grouped together to form categories. The next step was to identify subcategories. Linkages were then made among the various categories by identifying the core themes around which all the other categories were subsumed and from which a story line was developed.

While I attempted to allow categories to emerge from the data my *a priori* beliefs and understanding from the literature are likely to have influenced my interpretation of the data. To allow a complete personal understanding and reflexivity, my preliminary analysis and interpretation was the subject of a meeting of a group of social scientists who were not directly involved in the project and subsequently with key people in KNH and UoN. This discussion helped in data verification, testing face validity and ensured that my analysis was grounded in a broader understanding of how systems change. Feedback from these meetings was used to refine the analytic process.

4.2.2.7 Ethical issues

In interpretive analysis the researcher, not a recipe, drives the interpretation and is responsible for comprehending data, synthesizing meaning, theorizing relationships and re-contextualizing data into findings (Thorne, Con et al. 2004). The researcher takes the responsibility of generating findings that have potential for credibility or interpretive authority beyond the artistic license of the individual author and takes ownership of the interpretation process. The researcher should recognize that adoption of erroneous findings in practice could have serious consequences (Thorne, Kirkham et al. 1997) . Thus before presenting the final work I had face to face discussions with senior academics from UoN and the KNH Senior Management Team and finally with experts in health management and in qualitative health research.

4.2.3 Quantitative Research

The quantitative research evaluated the process of care against agreed, best-practice standards for children admitted in KNH with an admission diagnosis of pneumonia, diarrhoea/dehydration or severe malnutrition before and after the introduction of ETAT+ training and provision of CPGs. The main outcome in this study was a change in the proportion of children who received care in accordance with best-practice guidelines in 2005, before any specific implementation efforts in terms of provision of written guidelines, training and reinforcement, and in 2009, a period in which these interventions were to be operational. The study is therefore based primarily on two cross-sectional estimates of the proportion of children receiving best-practice care, assessed using a range of key indicators, before and during the intervention. In addition, I collected cross-sectional data for the periods 2006, 2007 and 2008 to explore the temporal trends in proportions of children receiving best-practice care and link such trends to stages in the implementation of best-practice recommendations.

Null hypothesis: Package of intervention comprising of dissemination of guidelines, training in best-practice case management of seriously ill children and participatory strategies to promote adherence to guidelines do not improve the quality of care, measured against agreed process indicators, for children admitted with pneumonia, diarrhoea/dehydration, and severe malnutrition.

Alternative hypothesis: Correct assessment, classification, treatment and follow-up care, assessed using agreed process of care indicators, for pneumonia, diarrhoea/dehydration, and severe malnutrition will increase from 50% in the pre-intervention period to at least 65% in the post-intervention period.

Justification of design: I utilized a before and after design without controls. This design was chosen because i) There were only two university teaching hospitals in Kenya at the commencement of this study. These two hospitals are quite different in terms of patient load, patient's disease profile, staffing and other resources, with KNH being considerably larger. These hospital specific characteristics could be an alternative explanation of any differences in practice and ii) it was not considered appropriate to have internal controls because withholding basic knowledge in management of common serious illness is ethically problematic and in practice, dissemination of the guidelines in KNH began before this PhD research. Furthermore, internal controls within a single department and institution would suffer a major potential problem of contamination due to interaction and interchange between intervention and control participants and diffusion of intervention effects.

The inability to utilize perfect controls and the fact that the programme was implemented in a natural social, political and economical environs which the research does not have control of means many potential confounders may affect the results. To address, in part, these concerns this study allowed a careful plausibility assessment of impact by: a) collecting data for a period of 5 years - each having about 800 observations, this allowed me to investigate the relationship between increasing intensity of intervention and the outcomes of interest, b) including the participatory study that facilitated identification of known confounders, characterized possible mediating factors and their change over time and described the adequacy of the interventions delivery.

4.2.3.1 Sample size estimation

While designing this study, I made a very conservative assumption that the process indicators would demonstrate best-practice care in 50% of the admission episodes in the pre-intervention period and that improvement interventions could increase this

proportion to 65% at a minimum. Few studies are available to inform such sample size calculations (Grimshaw, Thomas et al. 2004; Laigong' 2006; Njuguna 2006). Detecting changes within one condition (for example pneumonia) indicated that data on 280 records would allow absolute effect sizes (changes) of 15% to be identified with level of significance set at 0.05 and with 90% power. With 140 records a change of 20% could be identified with significance at 0.05 and 90% power. Ninety five percent confidence intervals around the estimated mean performance for six month periods allowed trends in adherence to the ETAT+ recommendations to be evaluated to inform the plausibility of the study findings.

4.2.3.2 Sampling of medical records

My aim was to sample 70 records for each quarter of each year for each of the three tracer diseases (total 280 per year) using a modified multistage random sampling of the eligible medical records. The inclusion criteria ensured that all the diagnoses made by the clinician that logically implied the presence of the tracer disease were included in the sampling frame. The exclusion criteria also ensured that patients with co-morbidity that rendered the CPGs inappropriate were excluded. Details of the sampling technique are given in appendix 3.

4.2.3.3 Data extraction

Data extraction tool: An e-tool was developed using a web scripting language (Hypertext Pre-processor, PHP) with a structured Query Language database (MySQL database) backend (<http://idoc-africa.org/documents/download/id/209>). A standard operating procedure manual, also available in the website was developed to standardize data abstraction. The study tools were piloted and alternative terms and phrases that describe different variables identified. The study tools were revised accordingly.

Data abstractors: The data abstractors had medical backgrounds. Three of them were nurses with a Bachelor of Nursing degree but three medical students on elective, who had finished paediatric training, also collected about 15% of the data. The data abstractors undertook one-week training on the use of the study tools and practiced data abstraction until they demonstrated competency judged by the completeness and accuracy of test data entered, where concordance of more 95% was considered satisfactory. The training was facilitated by the data assistant and myself.

Data entry: All the data entry took place in the library in the KNH Medical Records Department. The data were entered directly in the e-tool in laptops. Towards the end of each day a STATA 'do' file was run on all entered data looking for missing data and enforcing range and consistency checks. Any possible errors were listed in an output log file and then counter-checked by the data assistant prior to finalizing the (corrected) record entry. In addition, quality assurance was done by taking a 5% random selection of the medical records of those entered each day. Random selection was done using a basket of ballots. The data was re-abstracted by a different person and the two data entry episodes were cross-checked for accuracy and uniformity using a STATA do-file. The concordance ranged from 95-100%. The data assistant identified and discussed any discrepancy noted and clarified any issues arising to avoid recurrence of a similar problem. Data were stored on personal computers (PCs) and backed up in the KEMRI/Wellcome Trust Research Programme server at the end of each day.

Data cleaning plans: Plans for data cleaning were made *a priori* with the consideration that data were collected from patients' ward admission notes written in free text by trainee paediatricians. It is assumed, based on clinical logic, that recording some clinical findings has a specific implication for the presence / absence of another clinical sign. For example, a child who is documented to be able to drink implies that this child is alert.

Conversely, a child who is documented to have altered consciousness may be assumed not able to drink. A child who is able to drink or is alert implies that the child is highly unlikely to be in hypovolemic shock and thus it is appropriate to assume the pulse is not weak. I used such logical arguments to infer clinical findings where these were not directly recorded for records from all years. Though WHO/ETAT+ does not recommend supplementing intravenous fluid (IVF) for plan C with parenteral dextrose, in view of the suboptimal nursing care, it was also assumed it was correct to supplement IVF with dextrose if it was in the range recommended for sick children (3-5mg/kg/min, +/-20%). Operational definitions of the quality indicators are summarized in Appendices 7, 8 and 9.

4.2.3.4 Data analysis

Descriptive statistics: Descriptive statistics of patient's characteristics included frequency, percentage, 95% confidence intervals or median and inter-quartile range as appropriate. To compare categorical variables in the pre-intervention and post-intervention period chi-square analysis was employed while a parametric (ANOVA) or nonparametric test (Kruskal Wallis test) was used for continuous variables with a normal or skewed distribution respectively. Confounding of association between the patients' characteristics studied and intervention was assessed using the Mantel-Haenszel test. Significant confounding was considered possible if the summary odds ratio (OR) differed from the unadjusted OR by more than 15% (Mantel and Haenszel 1959).

Analysis based on primary objectives: The performance of the composite indicators in pre-intervention (2005) and post-intervention (2009), with 95% confidence intervals are reported based on the approximately 280 medical records randomly selected for each tracer disease for those two periods. I used absolute percentage change of performance of the dichotomous composite indicators in post-intervention compared to performance in pre-intervention as the primary effect size (with 95% confidence intervals) for each

comparison. Chi-squared test for 2x2 tables are used to compare difference in proportions of patients that achieved composite process indicators in the pre-intervention and post- intervention periods. Kruskal-Wallis test is used to compare difference in median of the numerical outcomes.

Exploratory analysis: The mean performance of the indicators for the individual tasks and their 95% confidence interval were calculated for the pre-intervention and the post-intervention period to illustrate the actual performance of the individual tasks in these two periods. Similar estimates are provided for the intervening years 2006, 2007 and 2008 to aid interpretation of trend of change.

Trend of change: The chi-square test for trend was used to assess whether there was an increasing trend in the proportions of correctly managed cases with increasing intensity of intervention represented by calendar year. In addition graphic presentation of six monthly performance estimates of the composite indicators and the corresponding error bars at 95% confidence intervals are displayed to further explore the trend of change.

All statistical analyses were carried out in STATA Version 11 (StataCorp, College Station, Texas). Only pre-specified composite process of care indicators were subjected to hypothesis tests, elsewhere the proportion of correct performance and confidence intervals are used to aid understanding and explore effects of the intervention. Actual *P*-value is provided where hypothesis tests have been performed. No formal adjustment has been made for multiple hypotheses testing while a *P*-value <0.05 is typically considered statistically significant. Interpretation of results from this study should consider the magnitude of the change, its temporal association with intervention and the detailed qualitative investigation rather than just the *P*-value.

4.3 Integration of the quantitative and qualitative results

Having analysed the quantitative and qualitative data, the next step was to integrate results from the two research paradigms. The two research methodologies answered different questions but on the same topic. The results of statistical analysis showed 'what and by how much' practices changed while the analysis of qualitative data showed 'why' the intervention did (not) work. The aim of integration at this stage was to get a fuller and more complete picture of the overall results reflecting complexity and the multifaceted ontology of the phenomenon, described as 'metainference' by O'Cathain *et al* (O'Cathain, Murphy *et al.* 2007) (pg 150). The qualitative data set was used as the dominant one to explain and provide an in-depth understanding of the findings of the quantitative research. Moran-Ellis refers to integration at this point of research as interpretive integration where explanation is generated from empirical work which incorporates the knowledge produced by different methods (Moran-Ellis, Alexander *et al.* 2006). He adds that an integrated relationship, by itself, does not imply any particular epistemological claim – that must be based on a theoretical position concerning the intended purpose of bringing the mixed methods together.

I explored different theories and theoretical models to gain a deeper understanding and to attach meaning and significance to my data by using the qualitative data as lens to look through the quantitative data. The mechanics of interpretations depended more on the process of intellectual inquiry. The first step was to make a summary of the main findings from the two data sets. Then I examined the fit of hypotheses generated from qualitative research across all the domains of care depicted in the quantitative data. I took notes and reflected on the variations of performance across the tracer diseases. I moved back and forth constantly between the two data sets asking myself questions by using a framework adapted from Strivastava and Hopwood's work (Strivastava and Hopwood 2009), such as

'What are the data telling me in reference to the research questions? How does the performance vary across diseases? How does the performance vary across domains of care? What can explain this (statistics) - from the field results (themes), and are there other factors contributing to this relationship? What does this imply in regard to achieving the quality indicators in domain A? What is it I want to know according to the research questions and theoretical points of interest? How will it be understood by the professionals and the management? What is the dialectal relationship between what the data is telling me and what I want to know? Finally I asked myself what I wanted to know about the interconnectedness of the institutional, mid-level and individual professionals and the overall process of care in relation to the research question.

The integration was an iterative process; requiring frequent revisiting of the full data sets as additional questions emerged and new connections and deeper understanding of the data occurred. The findings were related to other empirical studies in this field and theoretical frameworks. Social cognitive theory and complex adaptive systems provided a framework for understanding my data. Application of these theories will be discussed in chapter 8.

4.4 Presentation of results

Results of the qualitative research are presented in chapters 5 and 6. Chapter 5 describes the adequacy of the primary intervention and the processes of the action oriented research. Chapter 6 describes the facilitators of and barriers to the process of implementation of best-practices. The evidence themes/categories and corresponding sub-themes are presented. Information is presented in tables where relevant. This evidence is presented as diary excerpts, which represent first order reality in this thesis. Chapter 8 presents the explanatory framework of this mixed method research.

I have presented qualitative and quantitative results separately and then interpreted the quantitative in light of the qualitative results. This format was chosen because this is an explanatory design. In addition I wanted to retain the characteristics of each data set to increase the utility of the results among diverse users such as clinicians and managers.

Chapter 5

Engaging Participants in Implementation of Best-Practices

Introduction

A central part of the study design was an appreciation that simply providing ETAT+ trainings would not be sufficient to change health workers' behaviour. Thus, my explicit role in this PhD thesis was as an active participant to facilitate change in behaviour of KNH staff. I acknowledge the *a priori* assumptions (section 4.2.2.2) that guided these activities. My mental model of this participatory action research was informed by the concepts of the PRECEDE-PROCEED health education model with the intended final outcome of embedding best-practices within KNH.

With the use of my diary, I made careful observations of the evolution of my efforts and other emerging efforts to support implementation of the best-practices while drawing lessons from this process. This chapter is therefore divided into three parts for clarity. First, I will describe my attempts to engage staff and management so that they were predisposed to make best-practices *routine* by enabling them to participate in the study. Secondly, I will describe the process of enabling staff and management to monitor progress uptake of best-practices and identify impediments to the implementation process. Finally, I will describe how solutions were implemented. I will illustrate how approaches evolved with KNH staff in response to experiential learning. In my research role I sought to identify what would work in this specific context and at the same time considered my level of engagement and that of the hospital staff and the extent to which the principles of the participatory approach were enacted.

These findings draw on data collected in my diary for over 18 months, including reflective notes which describe my attempts during real-time analyses of these data to understand and interpret events. I attended all the KNH departmental-level meetings related to implementation of ETAT+ recommendations and took notes that I later transcribed in my field diary. Official minutes were only produced for one of these formal meetings.

The actual implementation of quality initiatives during the action research gave me an opportunity to study the evolution of the process in real-time. This helped me gain a deep understanding of the barriers to and facilitators of implementation which is the focus of the next chapter. In this chapter, I will share the lessons I learned as the process of implementation evolved.

5.1 Description of the study setting

In this section, I will give a summary description of the study setting at the start and during the participatory action period before discussing the process of evolution of implementation of the quality initiatives.

I aimed to engage KNH staff in the action oriented process. The first step was to instil in the management a sense that improvement in care of patients is needed and that concerted effort and experience can be used to achieve desired standards of care. However, we (the researched and researcher) needed to enable ourselves to reflect on our experiences and practices as a group and as individuals in order to change the *status quo*. It was clear that we shared similar interests and my proposed study could be used to accomplish departmental goals. A core-group, which consisted of the co-authors of the scientific research proposal related to this PhD thesis, was the initial authority for quality of care (QoC) initiatives. We however, also needed to co-opt nurse managers and other staff who we felt were in position to assist in the actual implementation of the initiatives, many of whom had been trained on ETAT+. I felt this enabled them to participate in the implementation process. Although the quantitative data collection focused on three key diseases namely pneumonia, diarrhoea and severe malnutrition, the strategies used for reinforcing the implementation of ETAT+ recommendations are, I believe, generic. However, lessons learned about challenges to implementation are situated in the specific

context of KNH. I believe that many of the causal factors proposed in this thesis will, however, resonate with people familiar with providing care in large hospitals in low-income countries

Pre-existing mechanisms linked to quality of care review were restricted to KNH's traditional 'mortality meetings'⁷ that focussed on morbidity and mortality statistics with a few conveniently selected medical charts of deceased patients discussed, focussing on diagnosis and treatment. I observed that there was little attention given to either specific details of care such as drug dosages and supportive or nursing care. Minutes and attendance lists were not kept. Frequency depended on the ward consultants; two of the wards held one or two meetings per month while others had none for periods of over 6 months. The Department of Paediatrics, University of Nairobi (UoN) also held mortality meetings, with a similar format as above, every two months. However, KNH staff did not attend these and solutions proposed were rarely implemented.

My role as an academic with KNH consultant status was to work together with the KNH staff at all levels to identify impediments to change of behaviour, develop and implement feasible solutions and monitor successful uptake of best-practices. In this account I will use the first person plural 'We' to indicate collaborative efforts with KNH staff⁸. My position and background role (section 4.2.2.1) gave me some authority over more junior medical and nursing staff. However, for the more senior KNH or university departmental leaders I was only in a position to discuss ideas and attempt to negotiate or facilitate change when interacting with them as colleagues.

⁷ Term used in KNH for traditional unstructured clinical audit meeting. The choice of this term and discussion of only the records for the deceased patients implies that mortality was a common outcome.

⁸ KNH staff implies all regular health care-providers of patients in KNH. This includes KNH employees, the trainee paediatricians and the academics. All nurses and allied health workers are KNH employees.

5.2 Empowering staff to participate in implementation of quality initiatives

Promoting buy-in to the project: The first consideration given in this PhD thesis was to promote ownership of the project by the management and key clinical decision-makers in the hospital, who subsequently formed the core-group for implementation. This was done by involving them in the proposal writing. I also took opportunities to discuss the objectives of this PhD thesis in UoN department of paediatrics meetings or special departmental retreat sessions.

Enabling staff to participate: The next step was to enable KNH clinical staff to participate in the planning and implementation of quality initiatives. We did this through enhancing their knowledge and skills by having them undergo a five-day ETAT+ training. Though the idea of conducting ETAT+ training for KNH staff had been entertained by the management for over a year, it had apparently been 'impossible' to release more than fourteen staff from duty to attend the training. However, one of the core-group members⁹ organized ETAT+ training in May 2008 and in October 2008, training 37 and 31 KNH staff respectively. Participants included nurses, clinical officers and consultants. Staff were recalled from leave to attend the training or to cover the wards. Ward coverage was also enhanced by locum nurses. KNH coordinated and financed the trainings except for the instructors' allowances which were provided by KEMRI Wellcome Trust Programme.

There was quick 'buy in' to ETAT+ by trainee paediatricians and the academics. I felt this was because ETAT+ is evidence-based and previous 'mortality meetings' had revealed poor care. ETAT+ was thus included as a compulsory training in the postgraduates

⁹ Referred to as Dr W. (not his real initials) in this thesis, whose influence in implementation of quality initiatives I described further in section 6.4.

programme before the new postgraduates (trainee paediatricians) were allocated clinical duties in KNH and also became an examinable subject. By end of October 2008 almost all the trainee paediatricians (>95%), all the 15 KNH Clinical Officers, nine of the ten KNH consultants and eight of the fifteen academics who were directly involved in the care of the sick child in the general paediatrics wards were ETAT+ trained. However only 72/126 (57%) of the nurses, were trained and no allied health workers had the five-day ETAT+ training (Fig 5.1). I felt this was because ETAT+ was a programme that focused on assessment, classification and treatment; which were tasks undertaken usually by clinicians, although ETAT+ in reality goes beyond clinical practice guidelines (CPGs) (Irimu, Wamae et al. 2008).

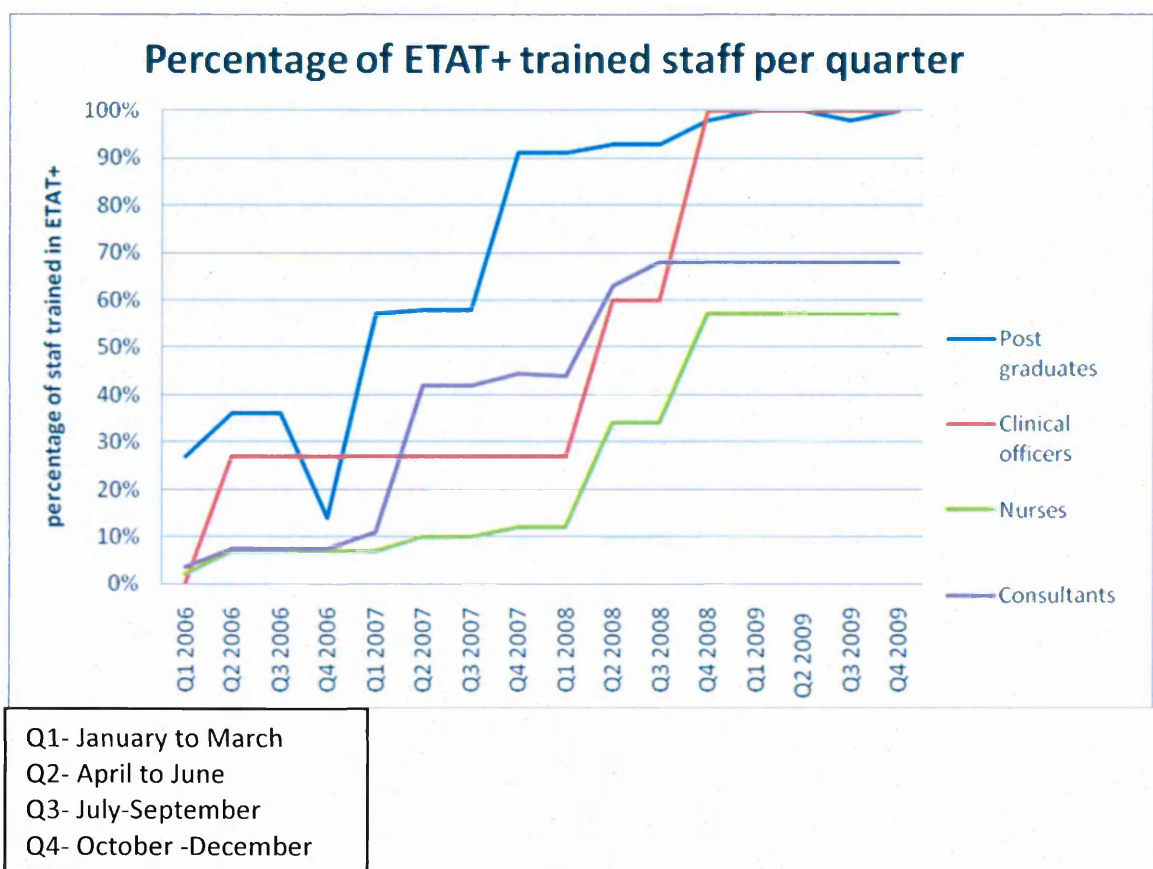


Fig 5.1: Coverage of 5 day ETAT+ training among the front line service providers in the paediatrics wards and Paediatric Emergency Unit (PEU).

5.3 Building staff capacity to identify problems and propose feasible solutions

The first step in enabling staff to identify problems in the implementation of ETAT+ recommendations was to set standards of care by developing quality indicators based on Ministry of Health clinical practice guidelines (CPGs) and ETAT+ training. The second step was to develop an approach of routine assessment of care against the standards of quality of care (QoC) considered feasible in KNH. Care which was inconsistent with these standards was considered to need improvement.

5.3.1 Defining desired standards of care

The KNH staff were involved in the process of developing quality indicators from the stage of planning, local adaptation of the candidate indicators to the context of KNH to selection of the most appropriate quality indicators (QIs). These QIs were adopted from ETAT+ and CPGs and were also used in my quantitative research.

Initiating development of quality indicators: To initiate the process of developing QIs, I was requested by the core-group to develop a list of candidate QIs derived from CPGs and ETAT+ recommendations. The candidate QIs covered the four domains of care spanning patient assessment, illness classification, treatment and monitoring of patients in the first 48 hours of admission. The QIs targeted the three tracer diseases namely pneumonia, diarrhoea and severe malnutrition.

Promoting staff ownership: A panel of 12 KNH staff was selected by the core-group to assist in the local adaptation of the candidate QIs. All the panellists were ETAT+ trained, thus it was assumed they all had copies of the main reference materials namely the WHO Pocket Book for Hospital Care for Children and the Ministry of Health CPGs. Four weeks before the face-to-face meeting each of the panellists was given a document consisting of

an explanation of why QIs were required in KNH and the list of the candidate QIs. The panellists were asked to indicate against each of the candidate QIs if they were: i) applicable to all targeted patients, b) feasible to assess from case records, c) linked to better outcomes defined by improved chances of correct diagnostic classification, survival or shorter hospital stay. The panellists were encouraged to revise the wording of the candidate QIs to remove ambiguity, to add and rate additional potential indicators and to collaborate with other staff in their discipline so that their responses reflected a wider scope of opinions. Only three out of 12 panellists completed the document. Others had misplaced them or simply said they were too busy. I felt this reflected deficiency of a culture of self-directed reading rather than unwillingness to participate in the exercise.

The next step was to decide which of the many possible candidate QIs were perceived as the most useful and meaningful and to further adapt the QIs to the local context using a consensus method adapted from the nominal group technique (Jones and Hunter 1995). This approach was chosen because we wanted a face-to-face meeting, a situation where scientific evidence could be provided promptly when required and an opportunity to introduce participatory initiatives in KNH. Thus a second panel, consisting of eight of the panellists from the initial panel and four new members was constituted for the face-to-face meeting. The meeting was moderated by the Chairperson of the Department of Paediatrics, UoN. She was nominated by the core-group because of her fairness in moderation of meetings. She ensured that all the panellists had an opportunity to express themselves regardless of their training background or experience. Each panellist was asked to rank the indicators in each domain of care for each of the tracer diseases in order of their appropriateness in assessing quality of care; ranking those most important to the patients' outcome highest. Each panellist, depending on their medical background and routine tasks, independently ranked each of the candidate QIs (each domain per

disease at a time). The ranking was reported to the group and recorded on a flip chart by one of panellists. Where there was discrepancy, the appropriateness of the candidate QIs was discussed and then re-ranked. My role was to direct the panellists to the evidence if the moderator felt it was necessary. The group then agreed on the number of indicators to be selected for each domain per disease.

The QIs agreed upon by KNH staff spanned assessment (n=24), classification (n=3), treatment (n=6) and monitoring (n=7) (appendix 2a-c). The process of development and dissemination of the QIs suggested lack of a self-directed reading culture, lack of awareness that quality of care (QoC) might be poor and poor communication mechanisms (Table 5.1). These had implications on the implementation of strategies to improve uptake of best- practices. In the next section I will describe how we attempted to institutionalize assessment of QoC against the QIs agreed upon by the staff.

Table 5.1: Steps in development of quality indicators (QIs) for process of care and lessons learned.

| Process | Outcome | Problems identified | What I could have done differently |
|---|--|---|---|
| Core-group planned for QoC initiatives (May 2008) | Planned ETAT+ trainings Planned development of QIs and agreed on use of consensus method (CM). Panellists for CM nominated A list of candidate QIs prepared | Core-group planned for QoC initiatives but had an expectation that while things needed to be done they were not to be actively involved in implementation | Devote more time to explain and negotiate the need for active involvement of the senior staff rather than accepting their more passive role as 'permission givers'. |
| Adaptation of candidate indicators by KNH staff (May 2008) | Wider scope of opinions obtained. QIs adapted to the local context. | Except for trainee paediatricians, staff had deficiency of a reading culture | Face to face communication and explanation might have been more effective but would be a considerable investment in time. To develop / engage an 'expert team' to take on this role might be a useful strategy. |
| Consensus method (July 2008) | Further adaptation of the QIs incorporating all stakeholder views. Set of QIs developed | Lack of awareness of the current standards of QoC; targets set very high in relation to current QoC. | A preliminary study to benchmark performance and inform performance target should have been conducted. |
| Dissemination of the QIs | List of the QIs submitted to the KNH head of paediatric clinical services with expectation that they would become departmental standards | Inappropriate communication skills and mechanisms; the management did not formally communicate the QIs to the supervisors and the front-line service providers. | Promote formal communication of the QIs, in face-to-face meetings and provide printed documents, to all staff. Advocate for revision of supervision tools to conform to the QIs. Hone management's skills of introducing and managing change. |

^a 12 health workers from KNH and UoN consisting of nurses (n=4), clinical officers (n=1), trainee paediatricians (n=2) and consultants (n=5) purposively selected by the core-group to ensure clinical background diversity.

^b The indicators were divided into groups to cover the domains of clinical assessment, classification, treatment and, monitoring in the initial 48 hours of admission.

5.3.2 Assessment of quality of care, process of giving feedback, identifying problems and solutions

We attempted several approaches to institutionalize assessment of QoC, however, as I will describe, none of these seemed to be sustainable. For clarity, I divide this process into several phases. These phases were not planned but represent successive attempts to

overcome barriers to the use of clinical audit as a tool to identify problems and feasible solutions and plan actions.

Phase 1: *Re-energising routine audit:* In June 2008, I presented audit feedback, which I had prepared for the UoN 'mortality meetings', to mid-level KNH managers. The audit revealed poor QoC that challenged the mid-level managers. They agreed in principle that better use should be made of routine audit. They recommended the use of the ETAT+ audit tool 'Problem based mortality audit' . The hospital administrator¹⁰ and a member of the Quality Assurance (QA) Unit were tasked to coordinate the new drive. We assumed that the QA Unit staff were experts in audit, thus no instructions were given on exactly how they should facilitate it. Unfortunately, the proposed audit forms were not delivered to the wards and neither the QA staff nor the management followed up this issue.

Meanwhile two of the wards that were supported by more engaged ward consultants continued to hold their traditional 'mortality meetings', though erratically, but neither the proceedings nor attendance was documented. However, it was not clear how the ward staff were to feedback information to the *hospital* or how the information would be used. Holding the meetings themselves seemed the desired final outcome and, notably, the hospital's QA Unit was neither represented nor informed. No meetings were held in the other two wards. The first attempt to re-energize audit and integrate the ETAT+ audit tool into this system were thus hampered by inadequate distribution of materials, generally insufficiently motivated QA Unit staff who had not attended ETAT+ training and so did not comprehend the 'new form of audit' and mid-level management participation that was

¹⁰ One specifically for department of paediatrics, non-clinical with management background.

limited to authorising the new initiative. It soon became apparent that a more active facilitation of audit and promotion of staff ownership were needed.

Phase II: *Personal facilitation in ward-level clinical audit:* In September 2008, I decided to facilitate clinical audits at the ward level personally. By this time, with consent from the Department of Paediatrics of UoN, I had the UoN 'mortality meetings' suspended, since it had been agreed they were not effective without KNH participating, and instead facilitated KNH to take charge of hospital-level clinical audits. Thus, I was under an obligation to find an approach that would work for KNH and UoN staff. I provided all the four paediatric wards with copies of the ETAT+ audit tool and worked with the trainee paediatricians' team leaders of the respective wards to conduct the audit and organize feedback meetings. We had face-to-face feedback meetings attended by the doctors and the nurse manager or her appointee. KNH consultants, at least two per ward, supported the feedback meetings, but there was minimal support from the academics reflecting in part distrust in likely effectiveness or desire to be involved passively.

'...there is a need to involve everybody. Do not do it alone. We have said these things several times but they have not been successful. (31/5/08- senior academic)

'No, I have no time. You concentrate on some of these things and have no time to do university duties. Besides there are no resources to provide quality care'. (4/9/08 - Senior academic; - response to invitation to attend ward mortality meeting)

The ward-level audits revealed suboptimal patient care such as inadequate patient assessment, misdiagnosis, incorrect treatment prescriptions, failure to administer treatment to patients as prescribed and failure to review and monitor the progress of the seriously sick patients adequately. Problem-solving sessions did not appear productive at this stage. I recognized that the staffs' ability to identify problems was limited by a lack of insight and a fundamental gap in problem-solving skills. For example, they were

preoccupied with workload and patient congestion on the ward and the solutions proposed was to increase the staff. However, I felt that while the shortage of nurses was a problem, hiring more nurses that lacked competence and capability would not necessarily improve service delivery. Thus, I focussed on facilitating educational sessions, with an aim to improve knowledge and skills that staff perceived themselves as inadequate and at the same time improve skills in problem-solving and action planning (section 5.4.1).

I did observe that the trainee paediatricians were competent in carrying out audit and also giving feedback. Skills of carrying out audits and rapid hospital assessment and feedback were learned in the ETAT+ training. Therefore, after guiding the staff on the four wards on how to execute audit and feedback at the ward-level, I left it for the ward consultants and the trainee paediatricians to proceed with the audit and feedback every two weeks as was required by the hospital. The trainee paediatricians were keen to collect data for audit; however they did not feel confident to give feedback to colleagues and other professionals. I attributed this to inadequate engagement by the consultants and the management in this exercise. This left me, potentially, as the facilitator of all audit meetings which I did not consider appropriate without the active support of the management and each ward's consultants. In addition, I felt the consultants would feel that I was 'policing' the basic care their wards provided which might alienate them, and in turn, because this was a quality initiative, cause conflict if they did not feel they owned the *problems and solutions*. To avoid alienating the wider consultant body and to push harder for greater ownership among the mid-level managers and trainee paediatricians I tried another approach. The next step was to develop a short audit tool, making the audit process easier, while trying to promote engagement of the managers and consultants.

Phase III: Initiating hospital-level audit: In November 2008, the core-group met and acknowledged failure of the ward-level audits. However, efforts made to reinforce this initiative were insufficient. We discussed among other things development of a new audit approach. An audit team consisting of nurse managers, a hospital administrator, a representative of the trainee paediatricians and four paediatricians (including two academics), was proposed. The academics were not informed and minutes of this meeting were not produced. The task of the audit team was to develop a simple audit tool with dichotomous responses to reflect achievement (or not) of the QIs agreed upon by KNH staff. I facilitated development of the tools for each of the tracer diseases by providing drafts that were discussed by the group. These tools and their corresponding standard operating procedures (SOPs) were piloted and revised accordingly with input of the nurses and trainee paediatricians; an exercise that took about two months. The audit team discussed the audit tool in January 2009 and it was unanimously adopted. KNH head of clinical paediatrics demonstrated management's support of the audit by giving, to the audit team, an elaborate presentation describing the value of audit and feedback and how it could be done without blaming individuals. He stressed that KNH should have strength in conducting audit as depicted in the diary excerpt below.

'KNH is a training institution and has to set high standards// KNH has embraced the MoH clinical guidelines// guidelines are available and most people are trained// people are aware care can be audited through presentations made by Dr Irimu and they feel they want change//we already have performance indicators agreed upon by the hospital staff in assessing the diseases which contribute to more than half of our admissions'. (29/01/09 - KNH head of clinical paediatrics; - Audit meeting)

However, once again, the audit tool development seemed to be an end in itself and the management did not move to rapidly institute the audit process. Thus in March 2009, I sought guidance from the Deputy Hospital Director who acknowledged data were

required to monitor implementation of QoC initiatives. He delegated the responsibility of organizing audit and feedback back to the KNH head of clinical paediatrics. A meeting was urgently convened and the core-group nominated a new audit team comprising of five trainee paediatricians, four nurses and two KNH consultants to abstract data from medical records. The audit was successfully conducted in March 2009. The staff who participated in the audit exercise said it was an 'eye-opener'. Apparently only the trainee paediatricians and the consultants appeared sufficiently knowledgeable to undertake actual data abstraction, although they required constant reminders to use the SOPs to provide a consistent interpretation of the health-workers' performance.

A feedback meeting was then held that was well attended by KNH staff including consultants (n=7/10) though only two of the 15 academics attended. It was chaired by the KNH head of clinical paediatrics, who repeated his presentation on the value of audit. I gave the audit feedback, presenting the proportion of patients whose management was optimal in regard to the specific QIs. I felt some of the practices depicting lack of awareness of critical patient safety issues, such as wrong or missed diagnoses, drug errors and lack of evidence that treatment prescribed was given at all, would raise doubts on the reliability of our data. I therefore included photographs of relevant evidence. I also explained the audit criteria and used process maps to make issues more real to the staff. The feedback was followed by a problem-solving and action planning session. The staff identified problems hindering implementation of the best-practices, proposed solutions, identified the persons responsible and stated a time frame for action. Solutions proposed included improvement on the format of treatment sheets and staff to be educated on interpreting patients' vital signs. The issue of staff shortages however dominated the discussion; some of the consultants argued that nurses are too overworked to provide better care while others argued for prioritization of care for seriously sick patients.

'Yes, we all agree there is acute shortage of nurses, but the issue we are discussing is prioritization of care. Even at home, for example, if there is not enough food, you can't say everyone will not eat, you plan what you can afford, but ensure that the young children get enough if possible. It is the same way we should prioritize care of the very sick patients'

(3/3/09 - KNH consultants; - Audit feedback)

Although it finally appeared that a mechanism had been identified for engaging staff widely in audit as a means to quality improvement, we did not conduct any other hospital-level medical audit. The audit exercise was still dependent on my physical presence; it appeared that mid-level management was not willing to appoint a KNH staff to take charge of the approach. They appeared content to devolve the process to me without feeling the area was a priority for their attention. I observed that having worked in KNH for a long time, most staff and the management too, regarded me as an insider rather than a researcher. However, devolution of the process came with neither substantial support nor authority. Thus, though we had a problem-solving session with an action plan developed hardly any action was taken and there was insufficient monitoring of proposed action. In this way, the same problems revealed in the ward-level audits in September 2008 kept on recurring. As staff attributed most of the problems to a shortage of resources and facilities, the next approach tried was to combine audit of the process of care with assessment of the structure in which care was delivered.

Phase IV: *Abandoning clinical audit for a broader hospital survey approach* (rapid hospital assessment): In May 2009, in response to a request I made in June 2008, the KNH management finally appointed a KNH paediatrician¹¹ to coordinate the clinical audits and

¹¹ Referred to as Dr W in this thesis, whose influence in implementation of quality initiatives I described further in section 6.4.

mortality meetings. He had a lot of experience in conducting rapid hospital assessments (RHA) for the District Hospital Improvement Project as an external evaluator (Ayieko, Ntoburi et al. 2011). I was a team member for the same project and in addition had assisted the Ministry of Health to conduct RHAs in several provincial hospitals. With his help, we therefore decided to attempt the RHA in KNH in order to assess both the structure and process of care. We felt this approach would allow the management to become involved actively and thus create a desire to improve QoC and supervision skills. We co-opted the nurse managers and QA unit staff into the survey team. Subsequently, we adapted the 'WHO generic assessment tool for paediatric care' to reflect all the KNH QIs and a scoring system to allow comparison across units (Paediatric Emergency Unit and each of the four wards). We targeted audit of QoC of children with diagnoses of pneumonia, severe malnutrition, diarrhoea and neonatal conditions.

We conducted a two-day RHA in July 2009. The KNH mortality coordinator and one staff from the QA Unit participated in the entire survey but the rest of the team joined briefly, at their convenience. Thus, our intention to build staff capacity to conduct RHA was not achieved. The assessment required one to be knowledgeable on case management and the equipments assessed; a potential limitation of this method. The nurse managers from the respective wards joined us as we assessed their wards. Interestingly, they appreciated the assessment and took it as a learning exercise.

KNH, through the hospital administrator, organized the feedback meeting in one of the UoN venues. We feared people might perceive feedback negatively, as this diary excerpt implies:

'Feedback should be presented in a manner that staff don't feel they are being policed, rather just making them feel even if there is a gap in care, they can manage to improve. Otherwise they can rebel and give-up.' (27/7/09 - member audit team; - Audit meeting)

My KNH counterpart presented the results of RHA, while I presented preliminary results for the quantitative work for my PhD thesis demonstrating changes in practice from 2005 to quarter 1, 2009.

The two presentations conveyed similar messages, that many aspects of care were inconsistent with desired standards of care, though there was marked improvement in drug dosing. After these presentations it became clear that different cadres had different issues to address related to their complementary roles. However, the global picture helped people realize the interdependence of the various functions. Therefore, after the major feedback session, I presented to the different cadres (trainee paediatricians, PEU staff, and ward nurses) the data that most specifically pertained to them, followed by a focussed problem-solving and action planning session. We focussed on modifying individual patient's care. To give every participant an opportunity to contribute, on four occasions I asked the participants to list on a piece of paper any problems they identified from the feedback, state the root cause and suggest feasible solutions.

Problems were identified in the entire continuum of care from assessment to monitoring of patients. Inadequate knowledge and shortage of resources compounded by inability to prioritize care for the seriously sick patients were cited by staff to be major problems. Some of the malpractices had become the norm and were hardly recognized as problems. However, explaining the scientific rationale and use of process maps helped the staff make more objective judgements. Often they were surprised when they realized that some of the *routine practices* were the problems. The KNH head of clinical paediatrics also explained the rationale of the best-practices we were advocating, for example in two of the audit feedback meetings, he did a power point presentation on what should be desired standards of documentation in medical records in a hospital of KNH standards. The staff solutions spanned purchasing items and using the available resources efficiently.

While the purchasing of required items was done within a short time, with support from the hospital administrator, it was a challenge to persuade the staff use the available resources efficiently or otherwise change staff behaviour.

Thus, though the RHA gave information on structure and process of care it was time consuming to conduct the actual survey and compile the report with the workload falling on a small number of individuals. We felt therefore it should be a 6-monthly event. A second RHA was proposed for January 2010, after action research for my PhD thesis was completed. Nevertheless, two years later no follow-up RHA had been conducted.

Shared data for my quantitative research: While KNH approaches were tried, changed and discarded I continued giving feedback of preliminary quarterly reports from my ongoing quantitative research. These reports compared achievement of the quality indicators in 2005 and the latest quarter. The trend of change was demonstrated by displaying results of the last four quarters. Feedback for quarter 2 (2009) was given in September 2009, quarter 3 (2009) was given in October in 2009 and feedback for quarter 4 (2009) given in March 2010. Each of these feedback sessions included a multidisciplinary meeting followed by (except last feedback) cadre specific feedback and problem-solving sessions. I made it clear to the staff and the management that my study was ending in December 2009 and so there was a need to adopt a strategy which would continue thereafter if they were committed to improving care. However it appeared that the main interest was in ensuring there was some process that met the hospital requirement for audit, which was also in the performance contract for the senior managers, but less interest in what audit should be achieving.

In brief, none of the attempted approaches to routine assessment of QoC seemed successful despite trying multiple audit tools or approaches that had been locally

adapted. Poorly defined staff roles, insufficient commitment by management to improve QoC compounded by inadequate managerial skills all contributed to failure of operationalization of the audit process (table 5.2).

One successful product of the attempts at audit was, however, several problem-solving meetings. Needs identified encompassed improvement of the process of care through knowledge and skill enhancement and improvement of infrastructure to support implementation of best- practices. Implementation of these initiatives is the focus of the next section.

Table 5.2: Stages in attempts to institutionalize clinical audits and my insights in the process

| Process | Action planned | Execution of the plans | My reflection of the audit process |
|---|---|--|---|
| Agreed on the principles of audit (June - September 2008) | KNH head of clinical paediatrics to send circulars to all ward managers and consultants' in charge that mortality meeting be held every two weeks. | Staff not issued with audit tools or clear directives and no follow-up of audit meetings | The managers had insufficient skills and motivation of introducing change in a system. Problems identified included poor communication, top-down operations system, inadequate monitoring, other competing priorities and, no reinforcement and follow-up strategies. |
| Personal facilitation of agreed ward-level medical audit (September 2008) | Adopt ETAT+ audit tool The trainee paediatricians audit medical records while I facilitate the feedback in each ward. The trainees to do audit and feedback every two weeks facilitated by ward consultant | Audit done but no feedback given when I did not facilitate. | Minimal consultants' support. Trainee paediatricians had insufficient leadership skills and hierarchical system compromised self-efficacy KNH staff and academics not compelled to know their clinical performance; good quality (rather than quantity) of care is not in their performance contract. |
| Initiated hospital-level audit (Nov 08 - March 09) | To simplify audit tool. Involve trainee paediatricians and nurses in adapting and piloting the tool | Audit tool adapted. Audit done by staff, I analysed data and gave feedback (March 2009). | Nurses and trainee paediatricians were willing to comply, chain of command is well established, but the management and supervisors did not sufficiently point this is a priority leading to poor sense of legitimacy. The top management continued supporting the audit process because audit reports were in their performance contract but they did not effectively support action for change. |
| Survey linked audit (May 09 - July 09) | To adapt tools for rapid hospital assessment (RHA) | One RHA done and feedback given. | A refresher course for ETAT+ and a formal training on the RHA tool should have been given to all potential participants on the RHA. Multidisciplinary feedback allows system-wide approach in problem and solution identification, but if basic care is poor then this should be followed by a cadre specific feedback. |

5.4 Implementation of emerging solutions

While the progress of audit was ultimately far from satisfactory some initiatives resulting from this were attempted. I now describe the evolution of educational meetings as a strategy for improving knowledge, skills and motivation to change, followed by improvement of the hospital infra-structure.

5.4.1 Improving process of care by knowledge and skill enhancement

For the purpose of this PhD thesis, I define educational meetings as planned sessions, attended by more than 10 people or three quarters of the targeted participants and lasting for more than 15 minutes, aimed at improving knowledge or skill of the staff. The term 'educational meeting' is used interchangeably with continuous medical education (CME)¹² in this report.

At the beginning of the project, we believed that CMEs would address gaps in knowledge and skills and enable the staff to implement best- practices. However, delivery of CMEs was adversely influenced by poor multi-disciplinary teamwork that hindered involvement of the allied health professionals in the early stages of this project.

Fostering demand for CMEs: ETAT+ trainings, problem-solving sessions and practice of evidence-based medicine by early adopters were key steps in creating awareness of the gap between what staff ought to know and what they actually knew.

Emergent CME groups: Initially CMEs were ward specific and all the front-line service providers were invited. After four sessions, we realized that CMEs needed to focus on

¹² Some countries use the term continuous professional development to refer to CME.

staffs' routine tasks. We therefore organized function specific CMEs at the convenience of the staff. But there was duplication of effort. We finally settled for task-oriented CMEs. The clinicians (trainee paediatricians and clinical officers in Paediatric Emergency Unit) sessions were attended by over 30 participants in all sessions while attendance for the CMEs for other groups ranged from 8-15 (Table 5.3). The consultants did not attend any of the CMEs as participants.

Timing of CMEs: Interestingly, time did not appear to be as much a constraint as timing; facilitators had to be flexible to give CMEs when it was convenient to the staff. Duration of CMEs ranged from 0.5hrs -2hours (n=29) to 0.5day-1day (n=3). However, of note is that for severe malnutrition, nurses and the nutritionists preferred a half or full day seminar suggesting the perceived complexity of the topic.

CME themes and formats: The fact that the staff themselves identified the gaps allowed delivery of CMEs focussed on very basic issues without appearing patronising to professionals. The clinicians preferred case scenario or mixed didactic and interactive formats with an emphasis on content knowledge. We felt that the nurses liked didactic sessions followed by practical sessions to impart procedural knowledge and reflective exercises that involved clinical auditing examining practices.

CME facilitation: Four trainee paediatricians, who were ETAT+ trainers, facilitated the initial CMEs for nurses on each of the four wards on a rotating basis, with the aim of delivering a total of 16 CMEs in four weeks on four topics chosen by the nurses. Each session lasted 30-45minutes. Eleven CMEs were held in February and March 2009. Thereafter the CMEs were erratic. I felt de-motivated upon realizing that the nurses took minimal initiative to organize the CMEs and, though they wanted their knowledge and

skills enhanced, they did not appear to make substantial effort to translate this knowledge into action.

The nurses preferred trainee paediatricians or me to give the CMEs. However, it appeared they were less interactive with me. I attributed this to the fact that generally consultants in KNH had a hierarchical relationship with the nursing staff, and it was unusual for academics to give CMEs on basic skills to other cadres except medical students. I also observed they were embarrassed by their lack of repertoire on basic knowledge and feared I might give up on the CMEs. This probably contributed to their discomfort during interactive sessions.

'I can see the staff are happy. We shall take height for all children admitted to the wards... The staff have been interactive today. I think they fear you' (11/9/09 - Nurse manager discussing with me after a CME on taking height facilitated by a trainee paediatrician)

The clinicians preferred topic experts, from within and outside UoN, to facilitate the meetings but the trainee paediatricians themselves also facilitated sessions after I mentored them. Nevertheless, though I had mentored the trainee paediatricians who facilitated the CMEs, content was an issue. For example, the trainee paediatricians focused on what they thought was important, such as advanced knowledge. Basic knowledge was generally felt to be adequate, despite the audit and feedbacks showing otherwise. KNH consultants did not facilitate ETAT+ related CMEs. I attributed this to insufficient commitment to improve care delivered to patients.

Table 5.3: Summary of the CMEs held during the study period.

| Quarter | Participants | Topic (number of CMEs) |
|----------|----------------------------------|--|
| Q3, 2008 | Combined ward staff ¹ | Supportive care ² (n=4) |
| Q4, 2008 | PEU staff | Use of pulse oximeter (n=1) |
| Q 1,2009 | ETAT+ trainers | Use of pulse oximeter and skills of teaching the procedure (n=1) |
| | Ward nurses | Supportive care (n =11) |
| | Clinicians ³ | Management of acute asthmatic attack (n=1) |
| | | Acid –base disorders (n=1) |
| | | Rational use of antibiotics (n=1) |
| Q2, 2009 | Ward & PEU nurses | Fluid therapy (n=1) |
| | Clinicians ³ | Fluid therapy (n=1) |
| | Ward nurses & nutritionist | severe malnutrition (n=1) |
| Q3, 2009 | Ward nurses | Fluid therapy (n=1) |
| | | Pneumonia (n=1) |
| | PEU staff | Severe malnutrition (n=2) |
| | | Pneumonia (n=2) |
| | | Fluid therapy (n=1) |
| | Clinicians ³ | Severe malnutrition (n=3) |
| | | Pneumonia (n=1) |
| Q4, 2009 | Ward nurses & Nutritionists | Severe malnutrition (n=1) |
| | Biomedical staff | Oxygen therapy (n=1) |
| | PEU staff | Management of acute asthmatic attack (n=1) |

¹ All the front-line service providers (nurses, clinicians and nutritionist)

² Oxygen therapy, intravenous fluid therapy, prevention of hypoglycaemia, interpretation of patient's vital signs

³ Clinicians – trainee paediatricians and the clinical officers

Support for the CMEs: The trainee paediatricians and the Paediatric Emergency Unit (PEU) staff owned their CMEs and organized them. The other cadres needed my support throughout in organizing CMEs. KNH provided meals for the participants when we held a

half or a full day seminar. Some external funding was provided for clinicians' CMEs where pharmaceutical companies provided breakfast¹³.

Challenges in delivery of CMEs: Punctuality was a big problem among all cadres. This, from my observations, reflected the norm in KNH and UoN as well. Sometimes lateness was attributed to poor communication of scheduled CMEs by the nurse managers. KNH and UoN did not provide substantial incentives for attending or facilitating CMEs. For example, attendance at CMEs was inconsequential in terms of staff appraisal or assessment of the trainee paediatricians' performance. In addition, although KNH and UoN had qualified as continuous professional development accreditation centres, by the criteria of our national regulatory bodies, at the time of this study none of the two institutions had applied for this legal status.

In brief, though we aimed for multidisciplinary education sessions in order to foster teamwork, it was not possible as the repertoire of basic knowledge was often lacking. Thus, we adopted task oriented CMEs analogous to the format in pre-service training. While junior clinicians organized and owned the CMEs, the nurses needed direction throughout. The activities involved in fostering demand and delivery of CMEs and the lessons learned are summarized in table 5.4.

¹³ Sponsors were made aware that the CMEs were serious learning sessions and were allowed less than 10 minutes to talk about one of their products, preferably on topics such as mechanism of drug action, and only for drugs recommended for use in children by WHO.

Table 5.4: A summary of activities involved in delivery of CMEs, challenges and lessons learned

| | Activity | Challenges | What could have been done differently |
|--------------------------|--|--|---|
| Fostering demand of CMEs | Creating awareness of knowledge gap among staff by exposing them to ETAT+ training, problem-solving meetings and, by staff observing early adopters best-practices | No effective learning culture, no substantive mechanisms of holding management and staff accountable for QoC and no substantial incentives for good performance or sanctions for poor performance. | Activities should have been multidisciplinary, advocate accreditation for CMEs, training of managers on monitoring and evaluation of QoC objectively and develop an appropriate tool for supervision. |
| Delivery of CMEs | Cadre-specific CMEs focussing on routine tasks linked to key quality indicators and needs identified by staff | No substantial incentives to attend or facilitate CMEs. Multidisciplinary sessions not possible, lack of basic knowledge necessitated cadre-specific educational sessions | Develop clear link between service provision and content of CMEs |

5.4.2 Improving hospital infra-structure

Change in hospital infra-structure was required to support implementation of best-practices. We did not change the hospital or departmental policies or standards; rather changes introduced targeted standards of care for specific patient groups. A system-wide approach was hindered by a culture of poor teamwork, poor communication and inability of the mid-level managers to point to staff that implementation of best-practices was a management priority. In this section, I will discuss three examples of challenges and attempted solutions: ensuring availability of basic equipment, prioritization of care of the seriously sick patients and finally, efforts to make the appropriate feeds for the malnourished child available.

Ensuring availability of appropriate basic equipment: Hospital assessments during ETAT+ trainings revealed that the paediatric wards were ill-prepared to handle emergencies despite resuscitation of collapsed children being common. Unfortunately, at the start of this PhD thesis, some key drugs and equipment were often found to be missing only at the stage of undertaking resuscitation procedures. In part this was due to poor organisation. For example, some items were in inappropriate places and in three

wards resuscitation couches were kept in the 'procedure room' while patients were actually resuscitated on ordinary beds. Although bag-valve-mask (BVM) devices were available they were not appropriately sized for the predominant age group of 2-59 months. In fact, it became evident that the staff and the nurses' managers were not aware of the specifications for equipment for paediatric resuscitation.

To address these issues in June 2008, triggered by an action plan from an ETAT+ training implementation meeting, management procured the appropriate BVM devices and each ward identified a place for resuscitation activities.

Prioritization of care of the seriously sick patients: Despite congestion of patients on the wards, care of the seriously sick patients was not duly prioritized. Discharged patients, retained on the wards because of non-payment of user-fees, continued receiving parenteral medications and their progress being monitored by nurses and doctors regularly, diverting staff's time from essential clinical services. Abandoned babies¹⁴, sometimes comprising up to 10% of the ward capacity, were also cared for by the nurses. Such contributions of poor organisation to poor patient care were recognised but had been tolerated for some years by front-line service providers. I attribute this to policy failure at different levels of management and effects on individual patient care are depicted in figure 5.2.

¹⁴ These were patients abandoned in the hospital or on the streets by their caretakers. They were admitted on the wards awaiting placement in children's homes, a process that often took several months.

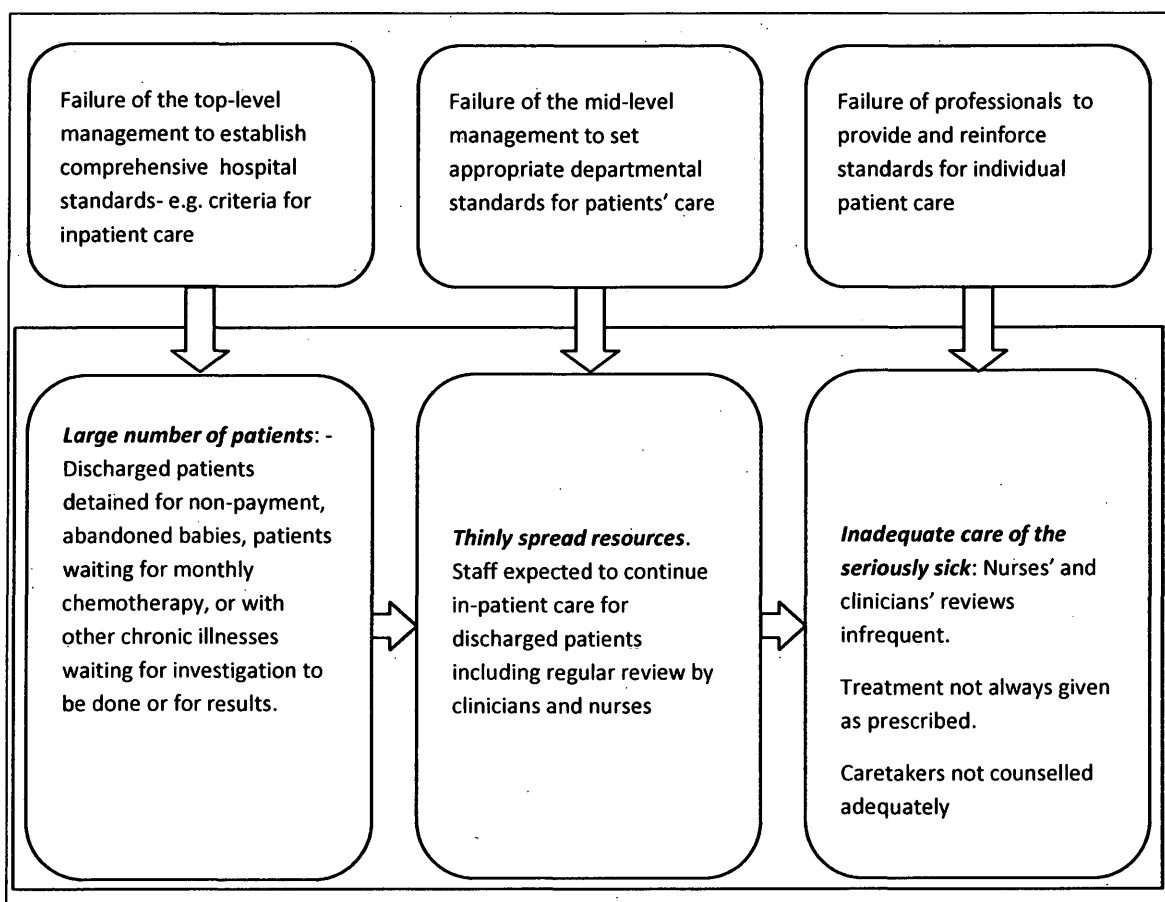


Fig 5.2: Policy failure at different levels of management and effect on individual patient care

From my observations and reflection one of the major causes of inadequate care for the seriously sick patients was lack of standards at institutional, departmental and individual patient levels. I will describe how the staff at various levels attempted to address this problem.

i) Mid-level management (nurse managers) initiatives to bring change: Nurse managers' efforts were initially directed at setting standards for the seriously sick patients. In February 2009, each ward nominated a nurse who, together with their respective nurse managers, was tasked to coordinate implementation of ETAT+ recommendations. These coordinators gave up after a short time because '*people were not willing to change*'. In June 2009, the nurses formed a task-force charged with improving nursing care. Initially

the nurses in the task force were very enthusiastic and they developed tools for monitoring these activities.

'I think now we are going to improve. We have formed a committee that we have called 'Team of Circles'. Their task is to monitor fluid management, to see if nurses are monitoring fluid, they also check on the treatment chart to see if the treatment is given. The third task is to ensure that very sick patients are given nursing care e.g observation of vital signs.' (2/9/09 - senior nurse manager)

However, again this initiative died after a short time without adequately achieving the objectives. Failure of these initiatives was again attributed to staff resisting change because they were overworked as illustrated by the diary excerpts below. Moreover, staff seemed aware that there were no substantial incentives to promote good performance.

'People (nurses) are not changing behaviour because they are overworked (28/4/09 - ETAT+ coordinator)

'You see there are many problems, issue of overcrowding (of patients on the ward), how do we address it? Nurses are rebelling because of overcrowding' (29/4/09 - senior manager)

'The large number of discharges has brought the morale of staff down, people can't work like this!' (11/6/09 - senior academic after a ward round)

ii) *Top-level management driven initiative:* In July 2009, the mid-level management invited key front-line service providers to discuss how to manage ward congestion following a request by the top-level management. In this instance, congestion was attributed to the presence of the caretakers on the ward, thus the solution proposed was that children over 48 months of age should not be admitted with their caretakers unless they were seriously sick, defined as having any of the ETAT+ emergency signs (MoH 2006). Instead nurse assistants would be employed to take care of the sick children. This was not formally communicated to staff and was not implemented.

iii) *Leadership emerged from within:* There was no clear leadership from the mid-level management but one of the KNH consultants, who I refer in this thesis as Dr W., helped fill this gap. The need to prioritize care for the seriously sick patient had been discussed in several problem-solving meetings but the management took no action. In August 2009, when Dr W. was transferred from PEU to one of the wards, he exercised his mandate as a consultant to improve care of the seriously sick patients on the ward he was assigned to. One large cubicle, equipped with six beds (alternatively 12 cots) and a nurse's desk, was made the 'acute room' into which all the seriously sick patient were concentrated. I observed that initially Dr W. conducted daily ward rounds in this acute room and emphasized to staff the importance of prioritizing care of the seriously sick patient.

'... I admit there is shortage of nurses. Even with the few nurses we have, how can we improve our care? we need to prioritize care for the very sick. Let's use the rule of 80/20- we use 20% of the resources to produce 80% of the results....' (10/9/09 - Dr W. commenting on poor nursing care in an audit feedback meeting)

The discharged patients were also pooled in one large cubicle and discharge prescriptions such as administration of oral instead injectable medication was effected. Staff and the management initially resisted this move, but with time it appeared that staff began to appreciate that the changes were bringing tangible benefits particularly on job satisfaction. Moreover, they supported these changes and felt some sense of ownership over them because they had been made to feel an integral part of the change process.

'.. we are piloting the project in ward .. (Dr W.'s ward), once it succeeds we shall scale it up' (1/9/09 - senior nurse manager commenting about reorganization of ward lay-out).

'I feel I have been given opportunity to think and use my knowledge to improve care. You can see even the nurses are happy with their work'. (4/11/09 -nurse manager responding to question on how she feels about the new ward lay-out)

The concept of prioritizing care of the seriously sick patient spread and was implemented in the other wards within one month. However, not all the wards were supported by their consultants, in two of the wards, only one or two consultants were involved while in one ward it was the decision of the trainee paediatricians and the nurses. Having concentrated the seriously sick patients in one room, it was assumed that the nurses and the clinicians would review them frequently. This however, did not happen as it required the staff to work differently for example investing more time on clinical duties. I felt that such a change required the active support and reinforcement by the top-level management and the consultants.

From my observation the initial resistance to change reflected a general negativism towards innovation. There was also concern over how to deal with discharged patients who were retained on the wards, for failure to pay hospital fees, in a way that was acceptable to the management. All this was compounded by lack of management's commitment or inability to supervise and guide the introduction of change. I felt that the management considered it inappropriate to supervise senior professionals who they expected to 'know everything'. This illustrates the inadequacy of managements' skills to introduce and manage change exacerbated by the hierarchical power structure.

'There is something wrong in this hospital. You want to improve care, so you introduce a change, people seem excited initially but then the steam dies off slowly. You see the hospital does not care, there is no supervision and so nobody cares'. (29/10/09 - Hospital staff)

'You know these people (top-level managers) say they are supporting us. But imagine they have not come to see what we are doing. They keep on saying that they will come. They only want to know what we are doing with the discharges. It is frustrating'. (4/11/09 - Nurse from Dr W.'s ward after reorganization of ward lay-out)

Making feeds for the severely malnourished (SM) available: It is recommended that SM patients be initiated on feeds immediately on admission and be fed at least three hourly thereafter (WHO 2005; MoH 2006). Availability of feeds for the SM patients was not a problem at the initial period of my study because commercially prepared feeds for SM children (F75/F100) were donated to KNH and the caretakers reconstituted the powdered milk. However, from June 2009 the donation ended and F75/F100 was prepared in the hospital kitchen from fresh milk. It was supplied to the wards at 0900hrs and 1500hrs to coincide with meals of patients in the entire hospital. Feed delivered at 1500hrs was expected to last until the following day despite the fact that room temperature storage should be for a maximum of 2 hours (WHO 2005).

'..these patients get milk at 9am and 3pm. Anybody admitted in between does not get milk until the next supply. Sometimes they get it the following day. At 3pm they get a cup each, but it gets spoilt by midnight. (then what happens?).. they wait until the when milk is brought next or some buy the milk from the shops' (10/11/09 - nurse)

'KNH buys enough milk and we have a commercial food mixer. We have everything except mineral mix, I was told it is not available except from UNICEF. For me, my big problem is these forms for ordering this milk, they only have a place for special milk....They are very old, they have no place to fill F75/100. But here we no longer make special milk, so I just prepare F100.... But one of the consultants last month told me to prepare about 2 litres of F75 per ward, but sometimes the porters refuse to carry F75 because it is not in the order forms' (17/11/09 - KNH kitchen nutritionist)

Problems identified regarding feeding of the malnourished child included poor storage of milk, poor design and knowledge concerning milk order forms and poor knowledge among the ward nutritionists in estimating the daily milk supply per ward. Diarrhoea was common among the SM children. It was attributed to composition of the milk, so the kitchen dietician abandoned the carefully designed formula and altered the composition

intuitively. However, diarrhoea could have been due to consumption of spoilt milk or high-strength milk (F100) given inappropriately in the initial re-feeding period.

Feed related problems were discovered late in October 2009 after several CMEs and after charting of the feeds actually given improved. The problem was partially solved in November 2009 when the head of paediatric nursing acquired, from a well-wisher, a refrigerator for storage of milk for SM. The Chief Nutritionist authorized that the evening milk be prepared at 1800hrs instead of 1500hrs and adequate containers for storage of milk overnight were also supplied. This demonstrates how problems are complex and can be caused by lack of awareness and not necessarily lack of resources.

In summary, we had some success in creating an environment conducive to best-practices such as ensuring essential equipment was available, cohorting the seriously sick patients to facilitate provision of care and also made it possible for the malnourished child to receive adequate feeds. Unfortunately these initiatives were implemented towards the end of the study and the benefits may not have been realized by the time this study ended. (Table 5.5).

Table 5.5: In improving the hospital infrastructure, challenges and solutions of emerging problems

| Activity | Problems | Achievements | Challenges | Solutions of emerging problem |
|--|---|---|---|--|
| Improving preparedness for emergencies | Lack of awareness of correct specification of paediatric items Key drugs and equipments missing | Essential items purchased, 'Resuscitation' corner at suitable area. Nurse managers developed checklist | Key drugs occasionally missing. Checklist for emergency drugs not updated regularly; could be attributed to a culture of poor documentation and lack of accountability. | Involving ward managers in hospital assessment |
| Prioritizing care of the seriously sick patients | Seriously sick patients not concentrated in one place, thus care not prioritized | Large cubical converted to be 'acute room' where all seriously sick patients were pooled while discharged children who had not left the hospital were concentrated in another large cubical | Infrequent review of patients by nurses and clinicians to allow decongestion of the new acute rooms. Few oxygen outlets in the 'new' acute rooms despite KNH having a central oxygen generating plant | Clinicians encouraged reviewing the seriously sick patients at least twice a day. Nurses encouraged assessing patients objectively; a structured nurse's cardex ¹ developed based on systematic approach as in ETAT+. |
| Making feeds for severely malnourished (SM) available. | Feeds given to the SM patients not properly monitored | ETAT+ feed chart adopted. Improved charting of the feeds of SM. | Improved charting revealed :- often 3am and 6am feeds not given :- Delay in initiating feeds for new patients. Milk got spoilt due to poor storage thus less milk was supplied and no milk reserved for new admissions Milk order forms outdated ² | Oxygen outlets increased in all the 'new' acute rooms from 2 to 10. Storage of milk for SM improved: - A refrigerator specifically for storage of this milk was acquired - wards supplied with adequate containers for milk storage - Chief Nutritionist authorized milk to be prepared at 0900hrs and 1800hrs |

¹ Nurses make their entries on patients' progress and care in cardex. They are useful for communicating between teams

² Milk order forms had no options F75 and F100. Had option for 'special milk' whose use stopped over 15 years ago.

5.5 My reflections on the participatory action research

The trail for this PAR was characterized by uncertainty, surprises and daunting experiences. Being informed by PRECEDE - PROCEED (P-P) health education models did not, I found, provide a very good preparation for this approach with my assumptions and *a priori* mental model for work challenged.

From a facilitator to a participant: In reality, in the first six months of the study or thereabout, I felt like I was lost in my own home village and among my folks. I had assumed sufficient functional structures existed to support the implementation of ETAT+ but this was not true. I thought we would put the essential structures in place at my pace because after planning it was usually left to me to solicit staff's support and execute change, but it was difficult. Being a legitimate insider I assumed we shared values and meaning, and thus I kept on trying to implement my mental plans informed by the P-P model. I did not realize then that by so doing, I ignored values and norms that different people construed when providing their services. In reality I had assumed the role of facilitator. I attempted to take a neutral stand and bracket my other interests, for example, not coercing people to do what I strongly believed was correct based on my background experiences. So I endeavoured to acquire the role of a researcher without vested interest. However, I felt some people were suspicious of my motives while some thought I was evading my responsibilities. For example, they had known me for a long time and I had a feeling they knew what I was capable of doing and would have preferred I take a leadership role.

I had therefore to step aside, reconfigure my approach, explore the boundaries of the problems and allow myself time to understand the institution from the action oriented researcher's perspective. What I found I needed was to collaborate with the staff and

take leadership to some extent while acting in the background as much as possible, avoiding a role at the forefront. This initial period was daunting, I had a feeling that the PAR might backfire considering that as an insider I had witnessed high profile initiatives started in KNH and not taking off.

This period was important for me, analogous to the period in which ethnographers learn the language of the researched community. One of my other challenges was learning how to be reflexive. In the initial months of the study I would discuss my observations with my social scientist colleagues who asked or commented “whose perspective is it? Are your observations guided by your values or those of the observed? It could be just your assumptions. How much is your interpretation informed by the experience you had prior to this study?” This was frustrating but with time I became conscious of how bias and subjectivity could shape my research.

As a participant observer of patient-practitioner encounters, I constantly shifted my role from that of a clinician to a researcher and back to clinician and so on. As it is the norm for KNH consultants to give hands-off advice such a role was accepted, this worked to my advantage. Though I was on the wards even at busy times, this approach gave me a space to make inquiries and observe how actual care was delivered rather being absorbed totally in the doctor-patient relationship which would have compromised my observations (Scheper-Huges 1990). I purposively converted these occasions to learning and enculturation moments.

My perception of gaining trust: I attributed the trust the staff and the managers had in me to the fact that I had plenty of time to listen and to talk to them; to do what they requested me to do and to let them take any credit that arose. I felt that the audit, feedback and problem-solving meetings also contributed to this trust (see below). I

observed that describing the process of random selection of the medical records for the audit made the audit feedback credible. I learned that KNH staff treasured learning, probably due to limited previous opportunities, and so I capitalized on this. My background experiences (section 4.2.2.1) enabled me convert most staff contacts to learning moments in an effort to generate mutual understanding.

My background role also made me develop what I experienced as genuine emotional ties with the participants. This was not only a research project; I wanted to make KNH a better place for all of us to work in by the end of my study. Though my primary focus was pneumonia, diarrhoea and severe malnutrition, I found myself engaging in quality initiatives relevant to the other ETAT+ related conditions such as neonatal care and improving hand washing practices.

There was however some initial mistrust. Before progressive focusing on the actual issues the management and some of the consultants would make statements indicating their view that I was the primary beneficiary of the project or I was creating problems.

'...these research papers you are generating you must include us as authors and other people in the hospital.... You can't be preaching what you aren't doing. In fact your strategy appears to attack the nurses and ensure the junior doctors work for the senior. In this hospital the seniors are the problem" (4/11/08 - senior manager KNH)

However, with time they realized what it meant to be co-researchers. That the research methodology was flexible and their interests could drive the agenda of the research, the data generated were accessible to them and they could use it. I made it clear to them that I was not an expert and we were learning together from our experiences.

Source of strength: I attribute any achievement in the PAR to the trust the management and staff had in me and the support of the implementation process by some of the staff,

for example a senior KNH consultant who I have referred to as Dr W in this thesis (see section 6.4).

Staff, by registering their appreciation of this work, gave me confidence to pursue the PAR despite what appeared to be frequent unsuccessful attempts and the uncertainty of the outcomes. The quality initiatives we implemented also acted as an impetus for further changes by the management, often changed ways of thinking and provided evidence that quality of care could be changed for the better as illustrated in the excerpts below. Such positive consequences of the PAR approach are important but are not well captured in the measured QIs focusing on clinical practices.

'... you have left a legacy in this hospital. I do hope we shall improve care. I can see it in you, you really want us to improve our care.' (5/8/09 - senior nurse manager after a feedback and problem-solving meeting)

'No, we can't stop what we having been doing (implementing quality initiatives), you have brought us very far, we can't let ourselves go back to where we were (before the project), surely we can't' (28/12/09 - Nurse Manager on response to what would happen when the PhD project ends).

Audit feedbacks: I felt that the audit and feedback meetings gave us an opportunity to establish a shared meaning of this PhD project, allowed us to socialize, have collective reflection on our practice and have experiential learning. Despite what I perceived as apparent lack of progress, staff were happy that audit and feedback meetings took place. In fact, I was requested on several occasions to include more diseases, to include Newborn Intensive Care Unit and cover all the departments in KNH. I attributed this to their ability to generate a previously lacking affective commitment to KNH as an organization by focusing on the good of patients as a motivation.

I was a legitimate insider and my behaviour as a clinician contributed to the behaviour studied. Thus I referred to the researched when reporting in the perspective of the first person (plural) 'we' instead of using the pronoun 'you'. I carried out the audit in collaboration with the staff, thus I gave the feedback on behalf of the group, again reporting as 'we' instead of 'I'. Whenever possible I engaged one of the managers in giving a related presentation or leading the staff to identify problems and suggest solutions. I believed this approach gave an impression of self-evaluation rather than managerial control. I felt that staff were indeed trying to get solutions to the many problems they faced. In fact some of the managers and staff occasionally asked me to intervene when they encountered problems in services related to ETAT+. This seemed to imply they felt there was a vacuum in leadership, in particular they (managers and staff) did not know who to approach when dealing with a care provider from a different discipline as illustrated in the excerpts below. I felt other managers sought affirmation, wanting me to recognize their efforts in supervision despite the system barriers.

'....I wanted to come and see you to discuss an issue..... I had taken a relative of mine to PEU and I was not happy with the way oxygen monitoring was done (using pulse oximeter) but I knew if I told you, you will act.' (12/08/09 - Post-graduate student, Internal Medicine, UoN)

Therefore, while audit was invaluable in identifying the magnitude of specific problems and guided educational sessions, I argue that focusing only on the sustainability of the process is an inappropriate way to assessing success of the PAR. In fact, poor results could have undermined broader and valuable efficacy beliefs because of a focus only on outcomes that I expected to change because the educational model assumed simple, linear dynamics while the reality was one of complexity. Furthermore, though the audit

and feedback observed confidentiality, I admit that the chances of emotional cost, such as embarrassment, guilt, shame or betrayal, were potentially high.

'..What is happening to our institution? Your presentation was very embarrassing. How can we allow that? You see unless people are made accountable, things will not change. Unless a person is chased out of KNH, not to practice here, people will not be disciplined.' (10/8/09 - senior academic after audit and feedback meeting.)

Knowledge enhancement: Initially I thought that knowledge management would be well described by a cognitive model (Bots and Hans de 2002). I thought I would focus on the ETAT+ context, with clear objectives related to achieving the quality indicators. However, contrary to my expectations, goals and needs for CMEs emerged that were driven in diverse directions by staff. I felt I had to let the format and needs of the CMEs be socially constructed and emerge from the context. These were unanticipated needs and took my time and effort and diverted my attention from simply focusing on implementation of specific guidelines and their quality indicators.

In this study, I ultimately used both cognitive and community models of knowledge management (Bots and Hans de 2002). I found the cognitive model was important because staff had a limited repertoire of basic knowledge and skills, however this required giving CMEs to uni-professional groups, going against the spirit of teamwork I was trying to foster. However, I argue that teamwork is productive only if the team members have a comparable level of training on skills relevant to their functions, and thus competency and understanding of their roles and how their actions contribute to better outcomes. As I have tried to describe, this did not appear to be the case between the different levels of doctors and nurses.

In regard to the educational sessions, for clinicians I had the advantage that I understood the pre-service training curriculum. I know what is taught (and not taught), so worked

with the clinicians to develop a structure for CMEs to address the basic knowledge, not taught in pre-service, but crucial in understanding the best-practice recommendations. For the nurses and the nutritionists, other than knowing their deficiency in knowledge and skill from audits and PAR, I had no clear idea of what they are actually taught in pre-service training. However, they are supposed to learn most skills in the practice area, that is, KNH and thus what was practiced in KNH is what they considered normal or even ideal. The results of this PhD thesis suggest that what was considered a norm was often not safe for patients and exposure of this may have undermined the senior nurses' confidence in facilitating the CMEs.

Relationships: As a consultant paediatrician, I was a complete participant but unlike my position before I started this study, I was now interested with 'why and how' questions. It was during the ward-rounds that I gathered most information about the 'what' of patients' care that I then explored further. Outside the ward round I developed an on-going dialectic relationship with the other staff. I had little difficulty getting information because staff associated me with the quality improvement project and I felt they trusted me (see above). Attempts to establish root causes of problems made me visit and acquire friends in units that I had not associated with before this study such as the kitchen, the printing unit, the oxygen manufacturing plant, the engineering department and the KNH senior administrative offices.

However, destabilizing the stable system or crossing disciplinary boundaries created some hostility. For example a senior academic complained to my immediate supervisors in KNH and UoN that my *'contribution on the ward was unsatisfactory because I was busy with ETAT'*-excerpts from a letter dated 4th Aug 2008. However, the time I was most affected emotionally was when I enquired from a ward nurse why five mothers of neonates aged

less than one week were made to share one bed and I was told '*Patients accommodation is a nurses' business* (implying it is not a doctor's business)'.

As a researcher and an academic I had to hold my emotions and not coerce people to do what I felt was right for the patient. I had to be patient and listen to the justification of why people performed unsafe practices and let them create a sense of ownership of the need to improve care. I had not set out with a clear idea on how to handle such issues rather they were negotiated in a more or less trial and error fashion, throughout the study, and built up my understanding of the situations I was observing. I felt it was important also to maintain the anonymity of those participants I worked with. In this way, although implications for patient safety were discussed in the CMEs and problem-solving meetings, I was careful not to disclose to anybody the identity of those involved.

Power (see section 2.3): With the intervention an additional form of structure emerged. The PRECEDE-PROCEED educational framework (P-P) adopted in this thesis was considered largely independent; the framework tending to ignore the interests of multiple agents by focusing on the interests of the totality and the outcomes. It tended to focus on individuals in the aggregate as: *people that offer care inconsistent with best practices* and attempting to shape them into a new form that submitted them to a set of very specific patterns of behaviours. By so doing, the framework rather ignores the complex play of power relationships at various levels when subject to the intervention and the facilitation provided by myself, the researcher. These include but are not limited to: i) the power of the ETAT+ course and guidelines developers over the hospital management and the staff; ii) my power as an ETAT+ trainer, facilitator in CMEs and audit and feedbacks, roles that gave me third dimension power over the staff and the management; and iii) the potential for me to exert an almost coercive power over trainee paediatricians given my position as their teacher. Although I felt such power was

moderated by the participatory approach of this study and, due to the centralized administrative system and limited coordination amongst senior staff, I felt I did not have authority which would be assumed from my status as a paediatrician over the nurses and the other cadres.

At the institutional level, and in regard to ETAT+ related best-practices, it appeared that the institution exercised little authority or power over staff's practices to improve adherence of best-practices. Consequent on the participatory nature of the study, the participants' actions (which were in consonance with prevailing norms) also had the power to shape my actions and often denied me the freedom to choose my ends and to act to attain them. In this complex relationship, these structures were what I was attempting to change while they exerted influence on me.

Patience (see section 2.3): As described above, as a researcher I acted on the participants and they also acted on me. Pursuing my goal of improving quality of care, the staff and the management may have suffered emotionally (section 5.4.2). The interventions employed in this study removed the autonomy the staff had, in a way making them suffer because a 'powerful' person scrutinized their services and pointed out to them where quality of care met or did not meet the desired standards or exposed professionals (as a group) whose ineffectiveness adversely affected the quality of care delivered to the sick children. Yet, their perceived constraints in delivering quality care were not addressed as they had anticipated. Rather than advocating for increasing the number of staff or increasing patients' space, we stressed better planning of service delivery and prioritization of care of the seriously sick patients. As a researcher in my own hospital, I also experienced the suffering I subjected the participants to. Being on the receiving end (of the

quality initiatives) allowed me to pay more attention to what the participants were experiencing, listen to them and engage with them to understand the consequences of the action research.

While as a researcher I acted on the researched, the participants also acted on me.

Due to the participatory nature of the study my actions depended on the interest of the participants. For example, I had to shelve my assumptions, and understand the researched from another perspective. What I thought was needed of necessity to change people's behaviour, in reality was different from what I was prepared to offer based on the PRECEDE-PROCEED model that guided my assumptions. This was an unexpected cost in time and effort and introduced uncertainty in my *a priori* plans and ability to predict any outcomes. I observed that the participants who demonstrated leadership also suffered in a similar way.

The suffering that the participants and leadership experienced could be attributed to the social structure in which we found ourselves in. I argue that all of us had contributed to the construction of these social structures. These structures continued to exist because of action or inaction of individuals (or groups), despite the fact that the senior staff could influence change by power endorsed by their formal leadership roles, authority or by their status.

5.6 Conclusion

Conducting PAR in a complex environment is a difficult process characterized by uncertainty and surprises, and it defies any systematic *a priori* plans and assumptions. The concepts of the PRECEDE-PROCEED health educational model that provided an apparently simple linear model linking outcomes to well laid strategies to achieve them initially complicated the scenario, making me concerned about lack of impact. However, PAR became an important learning process for me and for my colleagues to a degree, as the knowledge and experiences we accumulated began to inform and shape the unfolding plans, even if such plans deviated from initial, specific aims.

Some events, particularly those where leadership emerged, were successful. This acknowledges that such events are important ends in themselves and not just a means to improve patients' outcomes. Thus we successfully developed quality indicators and adapted several audit tools to the KNH context, engaging and informing many staff in such processes, even if we did not finally manage to embed in the organization a culture of clinical audit and use of data to improve the QoC. We held many CMEs and although we failed to make such systems routine those involved are likely to have been affected, to some degree, by this experience. Major achievements of this PhD action research did, however, include improving the hospital infra-structure to support implementation of best- practice recommendations. The pattern of successes and failures was not as predicted by the simple PRECEDE-PROCEED model but a result of the interplay of a complex social system, KNH, and the dynamics and power relations at play between the researched and myself.

Having presented an overview of my role in the PAR, in the next chapter I will discuss the barriers to and facilitators of uptake of ETAT+ recommendations that I identified after

analyses of my diary data and observations during the period of PAR, relating them to the context, history of the institution and behaviours of the organization and agents within it.

Chapter 6

Factors that Influenced Uptake of Best–practice Recommendations

Introduction

This chapter seeks to shed light on the findings of the quantitative research by illustrating what facilitated or hindered the provision of paediatric care in KNH in line with desired standards specified by agreed quality indicators (also discussed in chapter 5). These included patient's assessment, illness classification and treatment, monitoring and follow-up for the initial 48 hours of admission to the wards.

I aimed at introducing strategies, through participatory action research (PAR), to improve uptake of best-practice recommendations based on the PRECEDE-PROCEDE health education model. These interventions were delivered into KNH, an institution that had an existing organizational culture and structure. This culture of work and practice is produced by interaction of its diverse actors. As an institution, KNH also has a role within, and is partly shaped by, the wider systems of health care and higher education. It is the interactions with this environment that may help shape the 'change' response to an intervention. By introducing strategies to improve uptake of best-practice recommendations and observing these interactions as a participant observer in real-time, I hoped to understand why the ETAT+ recommendations were or were not successfully implemented.

Multiple sources of data were used to identify the barriers to and facilitators of uptake of best-practices including: i) daily entries in a diary, direct observations, experiences and insights reported by KNH staff I interacted with over the period from June 2008 to December 2009; ii) reflective notes I made to supplement these directly observed events or reported experiences; iii) notes made during hospital assessments, audit, feedback and CME meetings; iv) review of the KNH strategic Plan 2005-2010 and the revised KNH Strategic Plan 2008-2010 and, v) informal conversations with administrative and KNH's clinical staff captured in my participant observer diary. In addition, I conducted further

conversations with the administrative and clinical staff during data analysis to probe or seek clarification on some issues.

In this chapter, I will include excerpts from my field diary as quotes to illuminate the themes that emerged from analysis. They are, nevertheless, not intended to provide full representation of the natural inquiries. In addition, the arguments in this chapter are also based on the interpretations of observations that I made during the PAR as a participant observer with background knowledge and experiences of the phenomena under study (section 4.2.2.1).

6.1 Linking process to the organization structure

When describing the factors that influenced the uptake of ETAT+ recommendations, I first identified the thematic areas that arose from the data using an iterative process, outlined in section 4.2.2.6, to refine and clarify these themes. Rather than present these as a simple listing I have linked them to the simple organisational structure of KNH previously described (section 3.3). While I recognise that compartmentalising the themes identified risks oversimplifying their overlapping nature and often complex interplay, I use this approach to help achieve clarity in presenting the data. I therefore present facilitators and barriers in relation to: 1) KNH's institutional identity, vision and strategy - section 6.2, 2) nature of the intervention and how well it matched the institutional context of KNH - section 6.3, 3) roles and functions of mid-level management responsible for paediatric care in KNH – section 6.4 and, 4) social contexts manifest as existing staff practices and relationships that, in some cases, would be required to change as a consequence of ETAT+ recommendations – section 6.5.

6.2 Institutional identity, Vision and Strategy

It is the responsibility of the top-level management to define the institution's vision, mission and goals and to develop policies and strategies to help the hospital realize its objectives (section 3.3). As well as reviewing the institution's key strategic documents I had regular face-to-face discussions on clinical audit reports with the Deputy Hospital Director and I sought clarification of some issues with the Chief Hospital Nurse during the analysis of my data. I did not attend any of the formal meetings of the top-level management. Thus, my view of this level is derived largely from documents defining the institution's vision, mission, goals, policies and strategies that were reviewed. This was supplemented by insights gained on the enactment of such policies and strategies through my interaction with mid-level managers who acted in response to such high-level directives

6.2.1 Convergence of interest

KNH had articulated how to achieve the goals of the hospital in its Strategic Plan 2005-2010. To re-engineer the organization's behaviour the plan recommended that training needs to be assessed and regular continuous professional development meetings held as part of a commitment to the provision of quality care. These were budgeted activities. ETAT+ was introduced to KNH at a time when, despite this strategy, there were no regular educational meetings in KNH paediatrics department. The arrival of ETAT+ was thus an opportunity for the department enabling it to comply, with relatively little effort, with a major institutional directive. However, the fact that KNH financed and supported two major trainings in a period of five months and made commitments to training more staff might still not have happened were it not also for the synergistic role of the individual

actors (section 6.4), emphasising the interaction between factors that supported or prevented uptake of ETAT+ recommendations.

Though it was in the interest of KNH as an institution to have staff trained in ETAT+, the implementation process encountered several obstacles as described below.

6.2.2 Unavailability of explicit hospital standards

KNH's Quality Assurance (QA) Unit had been in existence since 1993 and had formal responsibility for developing hospital standards. The QA team was headed by a clinician who was supported by five KNH employees. However, at the time of this study there were no formal explicit hospital standards from which departmental standards and individual patient's standards of care could be developed.

6.2.3 A mismatch between vision and reality

KNH is referred to as a tertiary referral hospital whose mandate is to receive patients on referral from other hospitals or institutions within or outside Kenya for specialized health care (section 3.1.1). KNH's vision is stated as: 'To be a world class referral hospital in the provision of innovative and specialized health care'. These identities formed the basis of KNH strategic planning. However, they were in contrast with the reality that the majority of the paediatric patients attending and admitted to KNH's paediatric unit come from primary care centres with common, acute illnesses that do not require 'innovative and specialised' health care (Box 3.1). Thus while KNH aspires to be an institution that does not deal with the mundane the reality is otherwise, with further examples in Table 6.1.

Table 6.1: Idealised or anticipated role of KNH and 'The reality of KNH's service role'

| Idealized role of KNH (Strategic plan 2005-2010) | The reality of KNH's service role | Consequences |
|---|--|---|
| Patient referred from other hospitals or institutions within and outside Kenya for specialized health care OR patients with medical emergencies or critically ill | <p>Referring facilities not clarified in the strategic plan.</p> <p>Limited availability of public hospital care in Nairobi (there was only one district hospital in the city), patients bypass existing primary care and hospital services and present directly to KNH for primary care.</p> <p>Staff had insufficient confidence to triage patients and to take responsibility of sending them back to lower levels of care that are often felt by staff to be inadequate <i>'patient may die while on transit from KNH to the District Hospital'</i> and <i>'when we turn patients away, they come back in worse condition and come to die here in KNH'</i> (Senior manager).</p> <p>Stated policies not communicated effectively and not consistent with operational policies - <i>'it is hospital policy that nobody should be sent away'</i> (Senior manager).</p> <p>Limited active discourse between top-level and mid-level management to solve the disparity between KNH's policy and the reality of its patient population</p> <p>Weaknesses in the lower level health facilities not adequately addressed by KNH outreach services</p> | <p>All patients seeking care in KNH were attended.</p> <p>The majority of KNH paediatric patients could in theory have been managed at lower level health facilities such as district hospitals</p> <p>KNH served as a national referral facility, a provincial and district hospital and, as a primary health care centre for walk-in care</p> |

The fact that ETAT+ recommendations championed improvements in management of common conditions, this also, in some ways, countered this inspirational national role and meant a focus on their implementation was often met with mixed feelings. Further, in line with its nominal role as a hospital for specialised care, the physical infrastructure and human resources available were often not the most appropriate for an actual role caring for the acutely sick child with a common childhood illness. Examples that illustrate the consequences of this role inconsistency are as follows:

Inappropriate ward lay-out: I observed that the lay-out of the wards appeared based on the idea that relatively stable, chronically ill children might be admitted for investigation and treatment, with all four wards, comprising a total planned 240 beds, being almost identical. There was no central receiving or holding area for acutely ill children where

skills and resources might be concentrated. On each ward, rooms reserved for the seriously sick patients were too small to handle the large numbers of acutely ill children and were not in easy view of the nurses' station. The result being that acutely ill children, the focus of ETAT+ recommendations, were scattered around the wards, interspersed with children with chronic illness awaiting or receiving sub-specialist care.

Skill mix of the work force did not sufficiently match needs: In keeping with the specialized care vision, majority (22/25) of the paediatricians providing services in KNH were subspecialists or professors, largely driven by the university's aim to provide teaching in major sub-specialties. I observed that many of these sub-specialists perhaps felt less obligated to focus on the management of common illnesses that was regarded largely as the concern of the trainee paediatricians or other junior staff.

'..during your presentation some people (referring to a senior academic) were wondering whether you were presenting to the right forum.. I guess she thought it was cheap stuff'. (a senior academic commenting on my presentation to academics and trainee paediatricians on 'rational for fluid therapy for dehydrated patients')

Staff roles not adequately clarified: The staff in the hospital were left negotiating roles that tried to balance the vision of the institution and the day to day realities with little clear guidance. Although the KNH Human Resource Department had existed since 1991, no job analysis exercise had been conducted and no concrete job descriptions were provided to staff, leaving them unclear on their responsibilities for prioritising and implementing new practices. In fact, it was only in mid 2009 that the duties and responsibilities for the heads of department (HOD) were released formally. The HODs were requested to outline duties and responsibilities for the staff in their departments, a process that did not extend to defining the roles of consultants with sub-specialty training. Interestingly, the lack of explicit role clarity was not considered a major problem

by the management probably because professionals were expected to be self-organizing (implied by people being referred to as adults) or they felt they had no control over them.

'These are adults they know what they should do'. (Senior manager)

'Even if they are given a job description they will sign for them but later they will deny ever having received something like that..... job description cannot improve a person's behaviour'.

(Senior manager)

6.2.4 Limited strategic attention given to improving efficiency

I observed that from the point of admission to discharge and billing, services were not automated and relied on manual, paper-based processes. Laborious paper work made worse by the inability of management to supply pre-printed forms, duplication of work, tedious bureaucratic processes and the need to physically deliver documents from one place to another resulted in staff diverting their limited time from essential clinical work. Similarly, results of emergency investigations were often delayed, sometimes rendering them of less value for care of the patient. At the same time, the front-line service providers did not always have up-to-date information on drug availability resulting in prescriptions of unavailable medicines. All these shortcomings resulted in an inefficient system (Table 6.2).

Table 6.2: Effect of poor information system on the implementation process of QoC initiatives and areas where modern ICT could have improved efficiency

| Process in care | Effects of failure of poor information system | Areas where modern ICT could have improved efficiency |
|--|---|---|
| Process of patient admission and discharge | Manual paper-based processes. Filing in medical charts not in chronological order, notes for recent review could occasionally not be traced during ward rounds thus affecting continuity of care. | Avoid duplication of work and ensure patients notes are in order thus spare professionals' time for actual clinical work. |
| | Discharge summaries sometimes sketchy and diagnosis not always consistent with the diagnosis on the medical charts | Improve quality of hospital database to allow it be used for evidenced-based policy development. |
| Investigations | Results collected by the ward records clerk every morning but delay in filing them in the patient's charts reduced their value to patient's care | Timeliness in utilization of laboratory results to inform patient's management. |
| Tracking drug availability within the hospital | The store-men took the stock physically and gave regular updates to the pharmacists. | Improve information on availability to the prescribers. |
| | No system of relying timely information on drug availability to clinicians who sometimes prescribed medicines that were out of stock requiring patient to wait till the following day for prescription to be changed. | Improve transparency and accountability Saving time for professionals |

6.3 Attributes of the intervention that influenced uptake of its recommendations – did the intervention fit the context?

There are two aspects to consider. First, was the ETAT+ package right for KNH? I consider here all the issues related to the scope and dissemination of the five-day ETAT+ training, the training materials and the nature of the job aides that might have facilitated or prevented uptake of ETAT+ recommendations. Secondly, were there barriers and facilitators manifesting as a result of the measures introduced to improve the uptake of the ETAT+ recommendations and related to the specific context of KNH? As I had a major role as an active participant in the introduction of such measures these are specifically discussed, and their evolution was described, in the previous chapter.

6.3.1 ETAT+ Training met the needs of the staff

ETAT+ training was developed for use in district hospitals (Irimu, Wamae et al. 2008). It was introduced in KNH and UoN in its generic form due to the demand from those exposed to ETAT+ during the training course development. The attributes of ETAT+ that contributed to this demand in KNH are described below.

The training stimulated logical and critical thinking: The ETAT+ recommendations were backed by evidence derived from local and international research (Irimu, Wamae et al. 2008) , a fact that appealed to KNH that considers itself an academic centre. The evidence provided a logical basis for clinical decision-making while caring for the sick child. I observed that this evidence challenged the staff, particularly the paediatric trainees and helped some to abandon what they had learned and practiced for a long time. The self-reflection and critical thinking promoted by medical audit and hospital survey, which was part of ETAT+ training, also enabled staff to actively participate in problem-solving meetings and *own* problems and solutions. Further, I felt enabling them to outline a plan of action during the PAR made them feel they could change quality of care (QoC) and appreciate the possible role of audit, problem-solving meetings and continuous medical education which were discussed in chapter 5.

'Critical mass' trained: ETAT+ was easily integrated in the medical school curriculum. Other than for the life-support component, other topics in the ETAT+ training were already taught in the medical school; content was the problem. It therefore did not require a major change of curriculum or a high-level decision to adopt the ETAT+ course in the formal curriculum; rather it was accepted as a way of updating the curriculum to be in line with current evidence linked to a more modern teaching method. Further, introducing the training did not impose a significant or extra burden on the academic staff or consultants. In fact, as the ETAT+ instructors were mainly trainee paediatricians

(trained to train ETAT+); these junior staff took a more formal role in supporting learning for undergraduate students and other service providers. There was little 'cost' to persons traditionally expected to bring new practices to such an academic institution and thus institutionalising ETAT+ training, at least for undergraduate and post-graduate students was rapid. The latter in particular helped create a critical mass of trained clinicians responsible for admission care (Fig 5.1).

ETAT+ training was relevant and usable: The contents of ETAT+ were relevant to the daily routine work of clinicians and nurses in the paediatrics units and did not require significant extra resources. Covering the common serious childhood conditions and supportive care, it provided a comprehensive package for management of paediatric problems. Although my study focussed on audit of the three diseases (pneumonia, diarrhoea and severe malnutrition), supportive care was relevant to all seriously sick children, gaining ETAT+ support as a valued intervention.

'.. Training (ETAT+) was very good. But imagine I forced the organizers to include me. They did not want to include anybody from NICU (Newborn Intensive Care Unit).....(I wondered if NICU is not too advanced for ETAT+).... I learned a lot. We should organize another training. We are always resuscitating babies here. Even the nurses in labour ward need it'. (NICU nurse manager).

Job aides were an essential component of ETAT+ training. These included the clinical practice guidelines (CPGs), wall charts, paediatric admission form and feed monitoring charts. I observed that the brevity and pocket size of the CPGs made them truly a day to day aide and not a form of reference material. Wall charts for drug dosages were popular among the clinicians and the structured paediatric admission records used in ETAT+ training provided a template that was adapted for use in KNH allowing the institution to

rapidly gain a further success introducing its own structured paediatric admission records based on ETAT+ principles.

Positive outcome expectancy: The training covered the common childhood illnesses whose management required basic care and it appeared that the staff were able to observe positive effects on survival. It thus seemed that they believed ETAT+ recommendations worked. Effects on the outcomes were magnified in the elements of care that had been ignored previously. I observed that diagnosis of hypovolemic shock was extremely rare before the ETAT+ training and the intraosseous route was not used for resuscitation. After the training, staff developed confidence in identifying shocked patients and instituting prompt treatment.

'The thing (ETAT+) is working. We rarely get children dying from diarrhoea. If it happens, we ask 'why'. (...Has the case fatality really come down?)... Oh yes, I can show you our records... you know children really used to die, especially those who were in shock... anyway we didn't even know they were in shock'. (Ward nurse manager)

'We don't have deaths in PEU (Paediatric Emergency Unit) anymore, except those brought in dead. We manage patients well, fix IO (intraosseous) and we resuscitate ... you should be there when we are resuscitating. But we get disappointed sometimes because the care on the wards is not good, some of those patients die, sometimes they don't even get the (IV) fluids. (PEU nurse)

6.3.2 Inadequate adaptation of ETAT+

ETAT+ training was delivered in KNH in its generic form due to demand but without a prior specific needs assessment. I attributed some problems that were encountered during the process of implementation to inadequate adaptation of the training to the specific context.

Assumption about basic knowledge: During my interaction with the staff, I observed that among all cadres there was deficiency of knowledge in some very basic procedures.

ETAT+ training assumed staff had adequate procedural knowledge for the very basic skills (such as measuring height, monitoring patients and giving treatment as prescribed) and only gaps in knowledge revealed in an earlier study (English, Esamai et al. 2004) and updates were required, but this was not true for KNH. What I felt to be an unexpected deficiency in basic knowledge among staff, junior and senior, made it hard to adopt some recommendations but also questions the quality of their pre-service training where many of the basic skills should have been acquired (Table 6.3).

Table 6.3: Processes of care and knowledge or skills incorrectly assumed to be sufficiently present among the KNH staff

| Process | Knowledge or skill observed to be deficient among ETAT+ participants |
|--|--|
| Assessment of the key signs | Effects of illness on the physiology of the sick child which bring about the key signs. Perception of the health workers of the signs 'inability to drink' and intermediate levels of consciousness between a state of alertness and unarousable coma. |
| Assessing nutritional status | Measuring babies length '{...can we see your height measuring board?}. <i>What is that?We don't have one. (..and what's that?- I pointed at a height measuring board). I don't know, I have always seen it there'- a nurse giving responses in a rapid hospital assessment exercise.</i> |
| Treatment | Importance of administering drugs as prescribed and documentation of the same |
| Fluid therapy for dehydrated children | Incorrect but commonly used IV fluid for Plan C; Hartman's in 5% dextrose '... yes we use Hartman's in 5% dextrose for severe dehydration. We were told the blood sugar becomes diluted even if its e.g. 13mmol/l after giving plain Hartman's it drops quite low' – Clinical Officer justifying use of 5% dextrose Hartman's for Plan C during a CME. Monitoring rate of administration and charting fluid chart. 'Gosh we did not know.....you mean we have been doing rubbish work. God forbid' (nurse- during a CME on how monitor and chart intravenous fluid administration). |
| Monitoring of the sick child | Using serial respiratory and pulse rates to monitor patient progress and making clinical decision. 'if a nurse does not monitor patients vital signs what is she actually doing? (Nurse A) ...Before I went for paediatric nursing, I could not interpret vital signs. I believe they are not monitored because people don't see their value. (Nurse B)'. , |
| Feeds for the malnourished and also NG feeds | Storage of feeds, approximation of daily feed requirement. |

Training not adapted to the KNH resources: In contrast to incorrectly assuming knowledge of skills where they are missing, on occasions we failed to appreciate that KNH had more

facilities and the staff had higher qualifications than those in the district hospitals. For example, during ETAT+ training we encouraged giving dextrose to all patients suspected to have symptomatic hypoglycaemia (MoH 2006), we did not emphasize in the scenarios that blood sugar should always be checked when it was indicated, yet glucometers were readily available in KNH. Similarly, we did not emphasize use of height in assessment of nutritional status during ETAT+ training instead we encouraged use of the sign 'visible severe wasting'. In contrast, the quality indicators agreed upon by the KNH staff for audit of care in the quantitative research and 'routine hospital audits' took into account the available resources (Appendix 2a-c).

Assumption that KNH had schemes for on-job training and effective teamwork: I observed that the coverage of the ETAT+ training was incomplete in that not all front-line service providers were trained. During the preparation of ETAT+ training the hospital management was also advised to invite, to specific ETAT+ sessions, professionals such as pharmacists, laboratory personnel and nutritionists who participate directly in giving care to the sick child. However, only the clinicians and nurses were invited for the training. Further, during ETAT+ training, participants were encouraged to have regular follow-up educational meetings to prevent knowledge decay as well as to pass on their knowledge to those not trained. Despite KNH being a teaching hospital and having a large number of ETAT+ instructors, wider dissemination of ETAT+ did not happen (beyond the activities of this action research), although by September 2008 all the clinicians who were primary care givers of the sick child had been formally trained. I attributed this to poor multidisciplinary teamwork, professional boundaries and poor information sharing within KNH.

Existing job aides were inadequate and not update: During the ETAT+ training, we emphasised on use of job aides to facilitate the uptake of the CPGs. However, we did not

examine the appropriateness of KNH's existing job aides. The service delivery and monitoring tools such as treatment charts, vital sign observation charts, nutritional assessment forms and diet charts had not been revised to address changes in medical technologies.

'..the treatment sheets are inappropriate. We have raised and discussed this issue for the last three years and no action'. (Audit meeting; - senior KNH consultant)

I observed that the nutritional assessment forms and diet charts were based on approaches which were outdated more than 15 years ago had potential of being counterproductive to the effort to improve practice. The vital sign chart did not allow charting of respiratory rate above 40/min, suggesting that it was an adult chart adopted for use in paediatrics without adaptation.

WHO pneumonia classification provided mixed messages: ETAT+ used the same classification of illnesses as in the current WHO guidelines (WHO 2005). Thus, pneumonia was classified in order of severity as i) very severe pneumonia, ii) severe pneumonia and, iii) pneumonia as opposed to older WHO classification of severe pneumonia, moderate pneumonia and mild pneumonia respectively (WHO 1990). However, I observed during ward rounds and in the clinical audits, that both categories of severe pneumonia syndromes were often perceived simply as 'serious pneumonia' and considered as a single grouping worthy of treatment as 'very severe pneumonia'.

6.4 Mid-level management – action and inaction in support of implementation process

The shared aims of the wider ETAT+ approach and those of the institution discussed above resulted in the practical outcome of good cooperation with and ownership of the process of implementation by the mid-level management (section 3.3). I observed that

they appreciated that getting involved would allow them to 'succeed' in areas in which they had not done well previously. Nevertheless, mid-level management practices often continued to reflect wider institutional norms that had the potential to adversely affect implementation of ETAT+ recommendations. For example, challenges in nurturing multidisciplinary teamwork and optimize workforce capacity and in inculcating a culture of quality care as discussed below.

6.4.1 A shared agenda promoted ownership and mobilization of resources.

The mid-level managers, particularly the nurse managers and the hospital administrator, attended clinical audit feedback meetings held during ETAT+ trainings and participated actively in problem-solving meetings. I observed that through the hospital administrator, the mid-level management used discretionary resources at their disposal to improve the infrastructure to support implementation of best-practices. For example, they mobilized resources for initial meetings to develop quality of care indicators (section 5.3). Equipments such as height measuring boards and appropriate bag-valve-mask devices which were missing but identified as essential were purchased within a short time. To improve care for the seriously sick patients on admission, KNH in collaboration with UoN introduced a trainee paediatrician rotation to ensure clinical cover of PEU which was effective from March 2009.

6.4.2 Challenges in nurturing teamwork and optimize workforce capacity.

Ensuring that services were delivered adequately appeared to be a persistent challenge to the management due to poor teamwork between different functional units. I attributed this partly to: lack of clarity in staff roles, a centralized administrative system, poor

communication and, insufficient forums where working relationships could be discussed. I now discuss the impact of poor teamwork between institutions and among professionals.

Poor teamwork between UoN and KNH clinicians: Teamwork between UoN and KNH clinicians was pivotal because KNH served as a centre for specialized care and as a teaching hospital for the University of Nairobi Medical School (and other medical colleges). However, UoN and KNH were managed largely as independent institutions, an arrangement that I observed resulted in difficulties translating the apparent cooperation at policy level into practice at the departmental level. This may have been because the chairpersons of the major departments in the UoN did not participate in the KNH strategic planning process, where they were represented by only the most senior university staff, though their counterparts from similar KNH departments did. In fact, copies of the KNH strategic plans were not even made freely available to UoN staff.

Poor integration was also attributed to dissolution of the joint 'Division of Paediatrics' in 2004 which had the role of fostering good relationships between UoN and KNH staff (section 2.1.2).

'our relationship with UoN used to be good those days when we had 'Division of Paediatrics'. It was a unifying body between university and KNH; we could discuss our working relationships... Division used to channel issues through MAC (Medical Advisory Committee)... But one of the hospital directors did not like MAC, it was a very powerful body that made changes happen... Nowadays; we work like we have different interests. (Senior administrator, KNH)

On the ground, what was noticeable was the fact that most of the academics rarely attended meetings organized by KNH managers. Conversely, KNH paediatricians although they were allocated teaching sessions in the undergraduate and postgraduate programmes were rarely invited to attend UoN paediatric departmental meetings or retreats. Given the numerical superiority of UoN staff, only about a third of consultants

were directly answerable to the KNH head of paediatric clinical services, KNH authority and ability to assign and delegate responsibilities among senior clinicians was thus very limited. Furthermore, the major part of the day to day workforce was the 60 or more trainee paediatricians being trained by UoN in paediatrics, a cadre answerable primarily to the UoN (Fig 6.1). The diary excerpts below illustrate in general the kind of relationship that existed between most of the KNH and UoN consultants, there were however some exceptions.

'....KNH does not value our contribution and they don't respect us, it is a system which is not working, they don't invite us for meeting '(a senior academic)

'I can tell you I don't care what happens in Kenyatta. We already have a lot of work here (UoN)'- (in a discussion with a senior academic if I could be given more time to improve our practice area i.e. KNH)

'Collaboration? For what? Do we need them (academics)?'- KNH senior manager in response to my comment that we need to strengthen relationship between UoN and KNH.

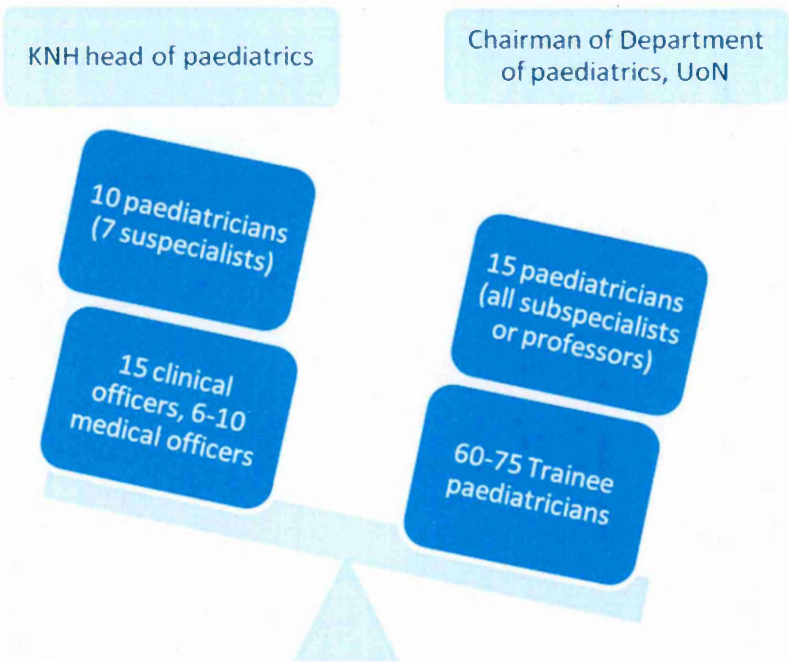


Fig 6.1: Balance of power between KNH head of clinical paediatrics and Chairman of Department of Paediatrics, UoN

Poor inter-professional relationships and team working: There was poor multidisciplinary team-working that could probably be attributed to the centralized administrative system. I observed that each functional unit was administratively independent of the others and no regular forums for inter-cadre relationship discussions were functional. For example, the nutritionists submitted their patient's notes to their head of department without leaving a copy in the patient's medical chart and often had no substantial discussions with the other front-line service providers. Such lack of cohesiveness resulted in poor information sharing which compromised multidisciplinary care and the ability to adopt new practices.

'...one of the problems we have in KNH is poor communication, we can have team work only if there is good communication' (audit feedback meeting- nurse manager)

Most importantly, it appeared that the KNH head of clinical paediatrics, who might be expected to take ultimate responsibility for service provision, did not have substantial authority over nursing or allied health professionals such as nutritionists, records officers, pharmacists or laboratory personnel. Lack of authority was also felt by some of the consultants in charge of the wards who felt unable to engage with the work of other cadres.

'...No, that (consultants checking treatment charts during ward round to ensure treatment is given as prescribed) will not work; we shall be at loggerheads with the nurses'. (Senior academic and ward-incharge; - postgraduate seminar)

6.4.3 Failure to inculcate a culture of quality health care

Although there was both a Quality Assurance Unit in KNH and a tier of mid-level management I observed that there was deficiency in a number of areas including: development, dissemination and reinforcement of departmental policies and desired

standards resulting in a failure to inculcate a culture of 'quality clinical practice'. Some brief examples are given below.

Institutional policies not adequately translated into departmental policies: The hospital vision, mission and goals are well articulated in the strategic plan. The hospital service charter was also developed in 2007. The few items that had been turned into specific operational goals at the departmental level were neither subjected to monitoring nor were they adequately reinforced.

'every ward is supposed to have mortality meeting every two weeks, every unit is supposed to submit a monthly report and their achievements as per performance contract, they should hand in a major report quarterly; but they are not doing any of these. (... have you sent a reminder?)..no they know what they are supposed to do. (Senior manager)

Inadequate planning for and reinforcing implementation of desired practices: KNH successfully developed structured paediatric admission records, prompted by ETAT+ training, to improve quality of patients' assessment and illness classification at PEU with a detailed history and assessment to be done on the ward at admission. Unfortunately, there was no consistent implementation effort after this successful first step. When the forms were introduced, where and when to use them was not explicitly communicated to the trainee paediatricians despite the fact that the trainees were responsible for admitting patients from PEU. Nevertheless, there was no obvious action taken if a clinician failed to complete the structured admissions records. Some trainee paediatricians completed both the structured admission forms and subsequently did full clerkship in free- text in PEU (or vice versa), though the latter was required to be done on the wards at admission by the clinical team from the admitting ward. I observed that this process was 'efficient' for trainee paediatricians as a group but not perhaps best for patients or the hospital. It resulted in seriously sick patients queuing for care at PEU and

the trainee paediatrician inadequately assessing the patients because they were 'overwhelmed'. However, management took no action, despite complaints from the PEU staff, perhaps because some consultants appeared not to understand the purpose of the structured admission forms and wanted all patients clerked fully at PEU in contradiction of the managers supposed policy. I attributed this to poor communication.

'...They (trainee paediatricians) say that consultants on the wards want all patients clerked fully in PEU not on the wards. So, they do usual clerkship and then fill the PAR (paediatric admission record) ... The nurses insist they will not take patients to the wards if PAR is not filled but sometimes they (nurses) have to take them to the ward because of the delay' (Nurse ; - meeting in PEU),.

Challenges in inculcating a culture of 'quality clinical practice'

Though there were no defined standards of paediatric clinical care, the KNH department of paediatrics had developed several written instructions (erroneously referred to as standard operating procedures (SOPs)) such as ones for conducting major ward rounds and for management of common clinical conditions. Their purpose was to facilitate the QA team to audit the clinical care although in reality this was not done. In fact, these SOPs were so inadequately disseminated that I observed that most nurse managers and other staff were not even aware they existed.

Where are those SOPs? I have been in this hospital for many years (over 25) but I have not seen any SOPs. (Senior academic; - clinical audit feedback)

Despite there being no explicit orientation package to acclimate new clinicians, yet there was very high turnover particularly of the trainee paediatricians and the MO interns, I observed that the KNH management had not considered communicating their expectations to any new clinicians. Interestingly, new nurses were oriented, but since

there was no developed orientation package and no established standards, they often learned inappropriate practices thus perpetuating poor quality of care.

A summary of the challenges in inculcating a culture of quality care in KNH is given in table 6.4

Table 6.4: Processes that challenged culture of quality care

| Process | Consequences |
|--|--|
| Reinforcement of departmental policies | Some policies were enacted by word of mouth and there was neither reinforcement nor follow-up Documents were sent to KNH staff in-charge of the wards but rarely shared with UoN staff |
| Planning and reinforcing desired practices | Technologies such as paediatric admission record, pulse oximeter, height measuring boards introduced but their use not adequately monitored. SOPs developed but insufficiently disseminated to the staff and their immediate supervisors. Failed to adequately reinforce desired practices such as regular mortality/clinical audit meetings and regular educational meetings Failure to explicitly communicate what KNH expected from clinicians; no orientation for new clinicians Evaluation of patients' satisfaction with services delivered was rarely done. |

6.5 Social context: Individual and group behaviour

A person's behaviour is shaped by the context in which they find themselves, and the behaviour of others as well their personal beliefs and values (Helman 2007). As part of the PAR related to delivery of the interventions, I mainly focused on enabling the staff to realize 'where we are in terms of quality of care' and 'where we should be'. As much as possible my role was to facilitate staff to lead the way to the desired destination. These staff included clinicians, nurses, nutritionists and records department personnel with varying levels of skill and authority. I will concentrate the discussion on the facilitators and barriers linked to behaviours that were, in my opinion, to a degree under the direct control of these professionals. In this PhD thesis, I have focussed on clinicians and nurses being the ones who largely determined the performance of the quality indicators.

Characteristics of the social milieu or individuals that facilitated or hindered uptake of ETAT+ recommendations are now discussed.

6.5.1 Emergence of leadership

Often to change from the status quo individuals or groups need a driver to lead them in a new direction (Lukas, Holmes et al. 2007), this seemed definitely true in KNH where the management were not perceived as filling this role.

'People are willing to change but they are missing leadership'. (Nurse manager)

As a researcher, I led the changes in a participatory approach. However, there may have been antagonism from those senior than I, given my status as a lecturer and not a KNH employee, potentially exacerbated by my links to the ETAT+ team, if I had attempted to adopt a strident, central leadership role. A senior KNH consultant, who I refer to as Dr W. in this thesis (see section 5.2 and 5.3.2), played a significant role soliciting support and leading quality initiatives from within the paediatric department from the time the study project began, building capacity to support implementation of ETAT+ recommendations. Dr W. had attended the Child Health Evidence Week in June in 2005 (Irimu, Wamae et al. 2008), which was held to create ownership of ETAT+ training materials among the stakeholders, and had participated in many district hospital QoC surveys. Dr W., despite being a paediatric cardiologist had a keen interest in common serious childhood illnesses. Within KNH, the staff had recognized his role in improving the service delivery in PEU where he was in charge and the only full-time consultant in that unit. His technical expertise had been recognized by the hospital and he had been designated the Chief Paediatrician (the only one in the hospital at the time), a post which while it had no administrative power denoted a role as a clinical leader.

'Changes need a driver like Dr W.....you need to translate what you have learned into practice'. (19/5/08 - ETAT+ closing ceremony; - Chief Executive Officer, KNH)

I will now outline some areas that display how Dr W.'s behaviour specifically facilitated uptake of ETAT+ recommendations.

i) *Leading from the front*: Dr W. appeared to empower the staff to give the correct care and was available to give supportive supervision. He was visible and created learning opportunities for staff, such as teaching on shock management. He performed clinical procedures that were not routinely done by other paediatricians for instance establishing intravenous (IV) and intra-osseous (IO) access. I observed that some of the trainee paediatricians unreservedly acknowledged that they learned most in PEU compared to other rotations.

'..Encourage the staff to do the right thing any time you are there, you don't have to be there all the time but be visible; they should feel your presence. They will do the correct thing. People are happy when they are supervised and appreciated'. (Dr W.)

'You know Dr W. is always here, he has taught even the nurses to do IO (intraosseous), when he is around he also does it. We call him anytime we have a difficult IV line'. (nurse manager)

ii) *Overcoming organisational inertia*: The process of planning for ETAT+ training for KNH staff had gone on for over one year. The management had said it was impossible to release 32 staff from duty for 5 days to attend the training. In April 2008 when Dr W., was informed of the intention to train KNH staff and the problems encountered, he organized an ETAT+ training with 40 participants that was conducted in May 2008.

'you see people trust me because of the changes we have made in PEU..., they recognize there is a gap in care... There was no problem; I just informed the training centre that the staff needed to be trained... There is money reserved for training and is usually not utilized'. (Dr W.)

In August 2009, Dr W. was transferred to the wards. Despite not having the responsibilities of the consultant in charge of the ward, in September 2009 Dr W. spearheaded reorganization of service delivery for his ward. This was intended to allow

prioritization of care of the seriously sick and create a working environment that was conducive to implementation of ETAT+ recommendations. Initially this meant overcoming resistance from ward staff and the midlevel management (section 5.4.2).

Interestingly, this leadership also inspired others to lead in a way that KNH as an institution had not done satisfactorily. Thus, two of the five nurse managers also displayed some aspects of clear leadership in implementation of ETAT+ recommendations and assisted in organization of educational and feedback meetings. The nurse managers had worked closely with Dr W. They attributed their ability to bring changes in their respective units to *‘being given opportunity to think by Dr W. on how to improve services’*

Thus Dr W. seemed to be able to facilitate change in health worker’s behaviour by leading from the front and overcoming the organizational inertia (table 6.5).

Table 6.5: Attributes and behaviour of the local champion that facilitated uptake of ETAT+ recommendations in KNH.

| Thematic qualities | Attributes and behaviour of the local champion which facilitated in implementation of ETAT+ recommendations. |
|---------------------------------|---|
| Lead from the front | <p>Regular supervision of staff, was visible and appreciated good performance</p> <p>Created learning opportunities</p> <p>Role model of a good clinician, actively involved in patients care</p> |
| Overcame organizational inertia | <p>Addressed the needs of staff (he was trusted by people because of his achievements in improving care and he understood the system)</p> <p>Took it as his personal responsibility to improve care</p> <p>Took risks of introducing change which were not owned by the management and staff at the onset</p> <p>Had patience for staff as they went through stages of change</p> <p>Empowered others in leadership roles</p> <p>Believed in ability to improve care with available resources (section 5.4.2)</p> |

6.5.2 A leader exercised her authority in favour of ETAT+

Having ETAT+ as a taught and examinable subject in the undergraduate and postgraduate programme in the University of Nairobi Medical Schools was a considerable achievement.

This would not have been possible without involvement of the Chairperson of the UoN Department of Paediatrics. The Chairperson in consultation with the academics allowed ETAT+ to be taught as a 'block course' and clarified to the academics and trainee paediatricians that teaching of the ETAT+ course was a departmental affair. She ensured that the lecturers and trainee paediatricians facilitated ETAT+ training and that the latter were not disadvantaged by providing training.

'...in actual fact I will do the timetable (for ETAT+). Everybody (academics) must take part. This is a departmental programme'. (Chairperson of Department of Paediatric UoN, meeting to plan for undergraduate ETAT+ training)

The Chairperson also gave me a mandate and protected time to strengthen the implementation of ETAT+ despite opposition from a few of the academics. As I had anticipated, this privilege did not last long (< 3 months) because some academics did not consider that KNH quality improvement initiatives were a university priority.

I observed that the Chairperson further influenced the credibility of ETAT+ recommendations in two major ways. First, in successfully facilitating the development of ETAT+-based KNH quality of care indicators (section 5.3.1), the chairperson provided visible endorsement by UoN of ETAT+ recommendations, giving the quality indicators credibility among the trainee paediatricians. Secondly, through her influence, ETAT+ became an examinable subject for undergraduate and postgraduate paediatric programs. As the goal of the trainee paediatrician was to learn good paediatrics and pass the university examinations their ambitions made them supporters of the recommendations.

In contrast to these positive aspects of individual or group behaviour, there were several characteristics of the KNH working environment that inhibited uptake of ETAT+ recommendations and probable changes more generally.

6.5.3 Individuals and groups - action (and inaction) to improve care

An interesting contrast was observed. Most people taking part in the audit and hospital survey during ETAT+ training, described these reflective exercises as '*an eye opener*' with attribution of poor practice to lack of awareness of the best practices; a lack of knowledge that could be addressed by the training. However, the management, academics and individual front-line service providers (even those who were ETAT+ trained), apparently continued not to question what others having been on the ETAT+ training saw as sub-optimal care, and appeared unable to challenge the *status quo*. Such fatalism was perhaps exacerbated by the fact that most of the practising KNH staff were trained in KNH, an environment where perhaps they had learned that many initiatives have limited success. Thus, I felt that this inadequate action could be attributed to lack of belief that change was possible, insufficient intrinsic motivation and, perhaps, lack of significant incentives to change, the latter linking back the performance of mid-level management. These therefore largely determined by the context the agents found themselves in.

In the absence of entrenched systems of promoting standards of quality care in KNH, I observed that consultants had considerable autonomy. This is demonstrated in the section above by emerging leadership who influenced capacity building to support uptake of the ETAT+ recommendations. While such leadership was exceptional, I give examples of where individuals and groups did not adequately adopt new recommendations that were increasingly becoming the desired standards of care.

Inability of consultants to create and implement professionally acceptable standards: I observed that the consultants, with exception of a few, did not effectively reinforce best-practices in patient-centred care. For example, 25% of the deaths occurred on the day of admission, yet the routine was for consultants to conduct post admission ward rounds on the day after the admission day. Thus, they had no significant direct input into the clinical

decisions and care of many patients who died. Similarly although each ward admitted an average of 25 patients per admission day and had 5-8 assigned consultants, usually only one consultant conducted the post-admission ward round if it was not a major ward round day (these occurred twice a week). On this round, in most cases, the consultant reviewed a few patients and left the trainee paediatricians to review the rest.

'..care (of patients) varies depending on the who is on the ground. Actually standards of care in this ward have gone down since Dr A (not her real initials) left. There is usually only one consultant doing the post-admission ward round, by 12 midday the consultant is tired and leaves the registrar (trainee paediatrician) to see the rest of the admissions.... This happens even in major ward rounds. The university paediatricians are only interested in undergraduates. So they review few patients'. (Trainee paediatrician)

I felt that insufficient commitment of the consultants to continuous improvement of care adversely affected the quality of care provided by other professionals.

'Supportive care in our ward is very poor. Nurses indicate they have given treatment, but if you ask the mum, you find that it is not true (...I asked why this issue was not raised in the mortality meeting when I asked where the problem was..).. consultants know about nurses cheating that something has been done and they chart falsely on the treatment chart. So why do we have to say this in the mortality meeting while they (consultants) are quiet. They know the problems in that ward'. (Trainee paediatrician)

As another example, perhaps because children are admitted to the hospital or the ward and not under the specific care of a consultant, there was little effort to ensure adequate medical record keeping although these records are legal documents. I observed that medical notes were often not labelled with a patients' name, date and time, or signed by a clinician. The content of follow-up notes was often sketchy and results for investigations rarely clearly documented. Some treatment charts were illegible with unauthenticated alterations and on some occasions nurses were given only verbal treatment orders. Although the poor quality of records was thus a frequent complaint, particularly during

problem-solving meetings and CMEs, I observed that they largely remained unchanged throughout the 18 months of this action research.

Implementation of evidenced-based practice (EBM) by the academics: Despite the department of paediatrics UoN being an academic department, there was little indication of a collective desire to practice EBM, rather I observed that there was desire for 'individualistic' expertise. This was despite making the local utility of research a key consideration for the many trainee paediatricians' dissertations conducted annually. The results of these projects were rarely shared with the KNH management and they were thus often of little value in terms of patients' care. Reliance on more easily accessible old sources of information (for example older textbooks) and expertise also meant consultants were sometimes out of step with new knowledge. For example, many were not initially familiar with the 10 steps in MoH/WHO case management for severe malnutrition. This caused difficulty for trainee paediatricians who wished to avoid conflict and pass examinations marked by these consultants.

'I don't want to hear those (WHO steps for management of severe malnutrition) steps. I want you to manage this child (with diagnosis of marasmus) as having failure to thrive so that we can give a holistic approach in the management' (senior academic, ward round)

'I am still very conservative; I would put this child on chloramphenicol and crystapen. Or doc what do you think?' (Ward round, senior academic asking my opinion on first line treatment of 2 week old child suspected to have meningitis)

6.5.4 Incentives that worked to prevent change

For several health worker groupings, there were actually persisting advantages in not adopting new recommendations. These were either unrecognised by management or not addressed.

Variable understanding about commitment of consultants' time to clinical services: In KNH, all specialists were referred to as 'consultants' and the 25 consultants from KNH and UoN were salaried. In addition, they all received a non-practice allowance to compensate them for forfeiting private practice. However, I observed that circulars issued by KNH stipulated that consultants (UoN and KNH) were required to conduct, each week, two major ward rounds, one specialist clinic and any other duties allocated to them by the hospital management. The latter included duties related to teaching of students and clinics for various subspecialties. In practice, consultants conducted none, one or two ward rounds per week depending on the consultant in charge of the ward and perceived seniority of the individual.

'Some of the people (consultants) want KNH mortality to remain the way it was many years ago. But if very sick babies survive in the private wing, why not in the general wards? Changes call for leaving comfort zone, that is why some people don't want change' (consultant)

'...when is your next audit? ...A niece of a friend of mine was admitted in the wards with diarrhoea and vomiting and died on the 3rd day. I felt sorry. We never think of the poor care we give our patients until one is affected directly. You see nowadays nobody cares' (consultant)

I observed that there were also mixed messages regarding private practice. Within KNH there is a doctors' plaza for KNH and UoN consultants that was intended to encourage the consultants to have their private practice within reach of KNH and consequently to admit patients in KNH private wards, supposedly a KNH income generating scheme. KNH top-level management therefore endorsed and supported private practice of hospital paediatricians and allowed them to act like non-salaried consultants, to be consulted when need be.

No defined performance measures for consultants: The management had apparently no explicit mechanisms for monitoring and evaluating quality of services offered by

consultants and there were no specific performance measures for this aspect of service. Interestingly what mattered seemed to be simply whether or not they 'showed up' during major wards rounds.

'First we ensure attendance (of ward rounds) then quality. But people are busy elsewhere, no time for KNH. For instance, one starts ward round at 4-5am in the private hospitals then goes to see patients in his private clinic. Although he has patients in his clinic he might not be happy to leave them to do ward round in KNH. The place which suffers is KNH because quality is not checked'. (Senior manager)

'Consultants do not do ward rounds (problem marked in one of the wards). They make technical appearances. Sometimes just report at 11am and then go away. We have reported this problem and no action...on the day they are on call they are reminded to come for the ward round but they don't come. (Nurse manager).

6.5.5 Conflict avoidance behaviour perpetuated incorrect practices

To many people it is a natural instinct to avoid conflict in a relationship with peers (Rojjanaprapayon, Chiemprapha et al. 2004). But I argue that conflict is a by-product of change that can be prevented by fostering transparency and trust in relationships that encourages free and open exchange of ideas. In KNH, there were limited forums for inter-professional relationship discussions such as ward meetings, clinical meetings or retreats. I observed that staff avoided conflicts but sometimes at the expense of patients' safety. Therefore, issues such as patient safety were not a sufficient motivation to risk conflict. I illustrate conflict avoidance behaviour by the following examples.

Inappropriate prescriptions and poor monitoring: Self-assessment or receiving feedback from others, mechanisms with potential of stimulating professional development, were not considered priority in KNH. In some cases, people pretended to follow instructions from consultants but then gave the treatment they felt was correct as illustrated in the diary excerpts describing fluid prescription practice for seriously sick child.

'..don't worry doc, I have done the right thing.... You know our consultant wants me to alternate 5% dextrose with Ringers' lactate. So that is what I wrote on the treatment sheet during the round. But I am giving Ringers fortified with dextrose and potassium chloride. You see I have to appear to do what I am told'. (Trainee paediatrician during an impromptu ward visit).

Patients did not always receive the prescribed treatment, even when prescriptions were appropriate. This was due to either failure to document administration, a true failure to give the treatment sometimes blamed on illegible prescriptions, or an inability to give treatment because an intravenous line was not present or patent. Whatever the case neither doctors nor nurses addressed these issues as illustrated in these diary excerpts.

'we don't document because the treatment charts are full. The doctors especially the interns scribble treatment instructions at any corner of the treatment sheet where we cannot document.... we can't tell them to rewrite the treatment chartsome of these doctors have an attitude. These interns should get an orientation, apparently no orientation and they do what they want. Besides we are not there to tell doctors what they should do, they are supposed know.'(Nurse manager; - meeting with ETAT + ward coordinators)

'Actually I agree yesterday most children did not get chloramphenicol and crystapen because most lines were tissueed. So some nurses gave IM (intramuscular) crystapen but not to all children but they feared to give chloramphenicol... No the doctor was not informed'. (Nurses manager ; - ward round).

Parents (or surrogates) accepted poor care to avoid conflict with the staff: Conversations with parents during wards rounds confirmed that some patients missed treatment, though drugs and other consumables were available. The nurses' attitude, as illustrated in the diary excerpts below, discouraged the parents from confronting such issues. I observed that some of the parents feared that reporting such incidences would jeopardize subsequent care.

'I told the nurse who was on night shift several times (that the child missed treatment), but she was just sitting (doing paper work) at the desk. For me doctor, I just want my child to get well and I go home'. (Parent, ward round)

'...problem is even attitude of the nurses. If the mother reminds the nurse to give treatment they would be ignored'. (nurse manager- my follow-up on the issue of failure of nurses to give treatment)

6.6 Conclusion

The process of implementation ETAT+ recommendations was facilitated to some extent by convergence of interest and the shared agenda promoted ownership and mobilization of resources by the hospital management. Within the institution also emerged leadership who facilitated creation of an enabling environment that supported uptake of the best-practices. ETAT+ training was acceptable to the KNH staff because it met their needs.

The implementation process however was not smooth and encountered several problems related to inherent problems in the management of the hospital, professionalism and competency of the individual health workers.

In the next chapter, I will present results of the quantitative research. It is hoped that knowledge on the adequacy of intervention and the level of engagement of the KNH staff in implementing strategies to promote the uptake of best recommendations (chapter 5) and the factors that influenced uptake of the best-practices in KNH described in this chapter will give an insight of the performance of the health workers illustrated by the quantitative data.

Chapter 7

Quantitative results

Introduction

ETAT+ guidelines on management of serious childhood illness emphasize three major tasks namely: i) adequate assessment of a sick child - eliciting the key clinical signs to allow the health worker to diagnose and classify severity of illness, ii) correct illness classification based on the clinical signs and iii) appropriate treatment based on classification of the severity of the illness. Finally, the treatment prescribed needs to be administered as prescribed with regular follow-up of patients by nurses and clinicians in order to monitor their progress or revise treatment. KNH staff concurred that these processes of care are crucial in the management of seriously sick children and agreed upon tasks which define quality of care in these domains in their context (appendix 2a-c). The desired performance for each of the quality indicators was set at 100% except for monitoring of intravenous fluid administration whose target was 50%.

The intensity of ETAT+ training over the entire study period (2005 to 2009) is elaborated in section 5.2. It is the basis of the definition of the distinct periods in this before and after design study. In brief, I refer to the year 2005 as the pre-intervention period. This is the period before the clinical practice guidelines (CPGs) and the ETAT+ programme were developed. This was followed by a period that was characterized by pilot ETAT+ trainings, ad hoc ETAT+ courses and subsequently formal ETAT+ training for the academics, paediatrician trainees and KNH staff. It was not until quarter four 2008 that about 100% of the junior clinicians were trained in ETAT+ and about 70% and 60% of the consultants and nurses respectively were trained. Thus, I refer to 2009 as the post-intervention period. The period between the pre-intervention and post-intervention (Jan 2006-December 2008) is referred in this analysis as the transition period. However, May 2008

to December 2009 was the period of participatory action research¹⁵ whose activities are described in chapter 5. The influence of action research on the health workers' performance will be explored in section 7.3.

In this chapter, I first present patients' characteristics and the adequacy of documented information upon which exploratory analyses depended on (section 7.1). Then, I present the results of serial observations of the study's primary process of care indicators for patients admitted with pneumonia, dehydration and severe malnutrition. I have categorized processes of care in four domains namely assessment, classification, treatment and follow-up of patients on the ward. For each of the domains I present i) the absolute effect sizes of the intervention, representing the work's main quantitative objectives, by comparing the performance of composite process indicators in 2005 and 2009, the pre-intervention and post-intervention periods respectively, ii) the performance in 2005 and 2009 of the specific tasks of processes of care that are components of the composite process indicators, and iii) trends in the performance of the composite indicators for the entire study period (2005 to 2009).

7.1 Study Population

In this section, I will describe the outcome of the process of medical records selection. This is followed by description of patients' characteristics for pneumonia, diarrhoea and severe malnutrition cases. Finally, I present data available from medical charts illustrating severity of patients' illness as documented by the admitting clinician.

15 This is the period in which I worked in collaboration with KNH and University of Nairobi (UoN) staff to promote uptake of CPGs and ETAT+ recommendations in a participatory action research role

7.1.1 Selection of patients

Disease specific medical records were randomly sampled from the list of those with relevant discharge diagnoses prepared by the KNH records department; the proportion sampled being inflated by estimates of the proportion meeting exclusion criteria (Appendix 3/Table2). We aimed to study 70 randomly selected records per disease per quarter (280 records per year per disease).

A total of 13,606 patients had a diagnosis of pneumonia during the entire study period (2005-2009). Using a hierarchy of random samples, 5448/13606 (40.0%) of the medical records were sampled, out of which 4577/5448 (84.0%) were retrieved and 1429/4577 (31.2%) of these met the inclusion criteria. Similarly, of the 14064 records with a discharge diagnosis of diarrhoea available, 3574/14064 (25.4%) were sampled, 3012/3574 (84.3%) were retrieved out of which 1536/3012 (51.0%) met the inclusion criteria. Severe malnutrition, a less common disease, had all the 2302 medical records with a discharge diagnosis of severe malnutrition sampled, 1922/2302 (83.5%) were retrieved out of which 1119/1922 (58.2%) met the inclusion criteria (Table 7.1). There was no major variation of the retrieval rate across the quarters for the three tracer diseases (data not shown).

Table 7.1: Process of selection of medical records for patients with discharge diagnosis of pneumonia, diarrhoea and severe malnutrition and outcomes of each step

| | pneumonia | diarrhoea | severe malnutrition |
|--|--------------------|-------------------|---------------------|
| Total records available in hospital data base from January 2005 to December 2009 | 13606 | 14064 | 2302 |
| Proportion (%) of records sampled from the total records available | 5448/13606 (40.0%) | 3574/14064(25.4%) | 2302/2302 (100%) |
| Proportion (%) of records retrieved out of the sampled records | 4577/5448 (84.0%) | 3012/3574 (84.3%) | 1922/2302 (83.5%) |
| Proportion (%) of records that met inclusion criteria out of those retrieved | 1429/4577 (31.2%) | 1536/3012 (51.0%) | 1119/1922 (58.2%) |

A total of 4,084 medical records met the inclusion criteria. Of the medical records studied, 1429 (35%) were pneumonia cases, 1536 (37.6%) dehydration cases and 1119 (27.4%) were severe malnutrition cases. The records studied per year for the three tracer diseases together ranged from 784 in 2009 to 836 in 2005. In the transition period between 2006 and 2008, 2,464 records were studied (Table 7.2)

Table 7.2: Medical records of patients with diagnosis of pneumonia, dehydration and severe malnutrition by year and study period

| | Pre-intervention period | Transition period | | | Post-intervention period | Total |
|----------------|-------------------------|-------------------|-------------|-------------|--------------------------|---------------|
| Tracer disease | 2005 | 2006 | 2007 | 2008 | 2009 | Overall |
| Pneumonia | 265 (31.7%) | 300 (36.1%) | 259 (32.1%) | 312 (37.8%) | 293 (37.4%) | 1,429 (35.0%) |
| Dehydration | 297 (35.5%) | 308 (37.6%) | 303 (38.0%) | 334 (40.5%) | 294 (37.5%) | 1,536 (37.6%) |
| Malnutrition | 274 (32.8%) | 223 (26.8%) | 246 (30.5%) | 179 (21.7%) | 197 (25.1%) | 1,119 (27.4%) |
| Total | 836 (20.5%) | 831 (20.4%) | 808 (19.8%) | 825 (20.2%) | 784 (19.2%) | 4,084 |

7.1.2 Patients' characteristics

I will now use information available from medical charts to describe characteristics of the study population. I will describe the severity of illnesses based on clinician's classification at the time of admission (section 7.1.2.1) while adequacy of documentation of key clinical signs that would allow retrospective classification of severity of illness is described in

section 7.1.2.2. In general, it was difficult to compare the clinical characteristics of patients because of inadequate documentation of clinical information over the entire study period. Thus, in section I draw comparison of patients' characteristics in the pre-intervention and post-intervention periods using only patients' characteristics for which information was available in the majority of the records.

7.1.2.1 Severity of illness on admission

The terms used in ETAT+ syndromic classification of each of the tracer diseases is given in appendix 5. In the pre-intervention period the majority of patients (84%, 222/269) with an admission diagnosis of pneumonia were not classified using terms consistent with ETAT+ classification. Improved use of terms consistent with the ETAT+ classification (Table 7.3) gives a misleading impression that there was an increase of the serious forms of pneumonia from 16% (43/269) to 75% (219/293) in the pre-intervention and post-intervention period respectively.

Similarly, there is an apparent increase of patients with severe forms of dehydration from 28% (82/259) in the pre-intervention period to 61% (180/282) in the post-intervention period which is likely attributable to an increase in documentation of classification of the severity of the illness.

With respect to malnutrition, clinicians used terms severe malnutrition, marasmus, marasmic kwashiorkor, kwashiorkor and protein energy malnutrition (PEM) in over three quarters of the patients across whole study period.

This differential documentation of the severity of the tracer illnesses compromise comparison of the actual severity of illnesses (or case-mix) across the study period and use of documented severity of illness in exploratory analyses (table 7.3). Details of adequacy of specific elements of documentation are given in the next section.

Table 7.3: Use of terms for severity of illness of the patients consistent with ETAT+ terms as recorded by clinicians on admission

| Target disease | Illness classification | 2005 | 2006 | 2007 | 2008 | 2009 |
|----------------|----------------------------------|-------------|-------------|-------------|-------------|-------------|
| Pneumonia | | n (%) | n (%) | n (%) | n (%) | n (%) |
| | | N=265 | N=283 | N=259 | N=312 | N=293 |
| | Very severe pneumonia | 3 (1.1%) | 4 (1.3%) | 15 (5.8%) | 26 (8.3%) | 53 (18.1%) |
| | Severe pneumonia | 40 (15.1%) | 45 (15.0%) | 92 (35.5%) | 129 (41.4%) | 166 (56.7%) |
| Dehydration | Not classified ^{a,b} | 222 (83.8%) | 251 (83.7%) | 152 (58.7%) | 157 (50.3%) | 74 (25.3%) |
| | | N=296 | N=308 | N=303 | N=334 | N=294 |
| | Shock | 0 (0%) | 5 (1.6%) | 13 (4.3%) | 8 (2.4%) | 25 (8.5%) |
| | Severe dehydration | 82 (27.6%) | 80 (26.0%) | 128 (42.2%) | 120 (36.0%) | 155 (52.7%) |
| | Some dehydration | 139 (46.8%) | 121 (39.3%) | 116 (38.3%) | 144 (43.4%) | 79 (26.9%) |
| | No dehydration | 1 (0.3%) | 4 (1.3%) | 9 (3.0%) | 26 (7.8%) | 7 (2.4%) |
| Malnutrition | Not classified ^{a,c} | 75 (25.3%) | 98 (31.8%) | 37 (12.2%) | 35 (10.5%) | 28 (9.5%) |
| | | N=274 | N=223 | N=246 | N=179 | N=197 |
| | Severe malnutrition ^d | 216 (78.8%) | 172 (77.1%) | 194 (78.9%) | 135 (75.4%) | 160 (81.2%) |
| | Not classified ^a | 58 (21.2%) | 51 (22.9%) | 52 (21.1%) | 44 (24.6%) | 37 (18.8%) |

^a 'Not classified' means a diagnostic label captured by the tracer disease inclusion criteria but not consistent with ETAT+ terms was used.

^b Includes pneumonia, bronchopneumonia and lobar pneumonia

^c Includes gastroenteritis and dehydration.

^d Includes severe malnutrition, marasmus, marasmic kwashiorkor, kwashiorkor, oedematous malnutrition and protein energy malnutrition

7.1.2.2 Key clinical features

I examined documentation of key clinical signs for each of three tracer diseases. Operational definitions of these clinical signs are given in appendices 4a and 4b.

The key clinical signs documented in more than half of relevant records in the pre-intervention period were cyanosis (59%), respiratory rate (78%) and oedema (70%), while documentation of signs such as ability to drink, level of consciousness, sunken eyes, pulse character, skin turgor, lower chest wall indrawing and weight for height Z score during the same period was between 0% and 40%.

There was a substantial improvement in the documentation of the key clinical signs during the transition period and the post-intervention period. Thus, documentation of most of the disease specific signs was over 70% in the post-intervention period. These signs included level of consciousness, cyanosis, lower chest wall indrawing, respiratory rate, sunken eyes, pulse character and skin turgor (appendices 5a-c). This clear difference in documentation between 2005 and 2009 explains the challenge of interpreting retrospectively classified severity of patients' illness at presentation. Therefore to compare the study population between different periods I used the patients' characteristics whose information was available in almost (>95%) all of the medical records during the entire study period.

Comparison of patients' characteristics

I will describe patients' characteristics using variables whose information was available across the study periods. These variables are limited to sex (information available in 100%, 4084/4084 of the records), age (100%, 4084/4084), weight (99.7%, 4073/4084), duration of cough for pneumonia patients who had a history of cough (96%, 1256/1311) and duration of diarrhoea for patients who had severe dehydration (98%, 1457/1484). For further

comparison of the study population over the study period I have categorized age into two groups; 2-11 months and 12-59 months.

I will describe patients' characteristics for each tracer disease separately because the stratification of random sampling was based on the patients' discharge diagnosis, not on the entire study population. I will present descriptive analyses and comparative analyses of patients' characteristics emphasizing the pre-intervention (2005) and the post-intervention (2009) periods.

Characteristics of patients with pneumonia

Two hundred and sixty five and 293 pneumonia cases were studied in the pre-intervention and the post-intervention period respectively. There was similarity in populations in median age, proportion of patients aged 2-11 months, median weight and, median duration of cough. There was however more males in the pre-intervention period (59.6%) compared to the post-intervention period (46.1%). The difference in sex ratio was unlikely to be explained by chance ($p = 0.001$) (table 7.4). Careful data checking however did not indicate any mis-coding. Moreover, using the hospital database of all discharged pneumonia patients (KNH's entire paediatric wards admission data), results from this sample were seen to represent accurately this broader pattern. Furthermore, there was no difference in sex ratio among the diarrhoea and malnutrition cases, also arguing against a systematic coding error.

Table 7.4: Pneumonia patients' characteristics (2005-2009) and comparison of characteristics between the pre-intervention (2005) and post-intervention periods (2009)

| Characteristics | 2005 | 2006 | 2007 | 2008 | 2009 | P-value 2005 vs. 2009 |
|--|----------------------------|----------------------------|-----------------------|----------------------------|---------------|-----------------------------|
| | N=265 | N=300 | N=259 | N=312 | N= 293 | |
| | n (%) | n (%) | n (%) | n (%) | n (%) | |
| Male (%) | 158 (59.6%) | 174 (58.0%) | 144 (55.6%) | 172 (55.1%) | 135 (46.1%) | 0.001 ^a |
| Median (IQR) age in months | 8 (4-14) | 8(5-14) | 8 (4-14) ^c | 8 (5-15) | 7 (4-14) | 0.89 ^b |
| No. (%) of patients aged 2-11months | 185 (69.8%) | 201 (67.0%) | 171 (66.4 %) | 198 (63.5%) | 206 (70.3%) | 0.89 ^a |
| No. (%) of patients aged ≥12months | 80 (30.2%) | 99 (33.0%) | 87 (33.6 %) | 114 (36.5%) | 87 (29.7%) | |
| Median(IQR weight)in kilograms | 7.0 (5.5-9.0) ^c | 7.1 ^d (5.7-9.0) | 7.2 (6.1-8.7) | 7.1 ^d (5.8-9.1) | 7.0 (5.7-9.0) | 0.69 ^b |
| Median (IQR) duration of cough in days for patients who presented with cough | 232 4 (3-7) | 246 4 (3-7) | 234 4 (3-7) | 273 4(3-7) | 272 4 (3-7) | 0.28 ^b |

^a Chi square test

^b Kruskal Wallis test

^c Denominator does not include three patients with missing values

^d Denominator does not include one patient with missing values

Characteristics of patients with severe dehydration

Unlike pneumonia patients, there was no statistically significant difference in female: male ratio in the pre-intervention and post-intervention periods ($p=0.200$). However, patients in the pre-intervention period were marginally younger (Kruskal-Wallis test, $p=0.003$) and of lower weight (Kruskal-Wallis test, $p=0.004$) than those in the post-intervention period and had a longer duration of diarrhoea (Kruskal-Wallis test, $p=0.016$) before seeking care in KNH. These differences were unlikely to be due to chance (table 7.5).

Table 7.5: Diarrhoea patients' characteristics (2005-2009) and comparison of characteristics between the pre-intervention (2005) and post-intervention periods (2009)

| Characteristics | 2005 | 2006 | 2007 | 2008 | 2009 | P- value 2005 vs. 2009 |
|--|------------------|------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|
| | N=297 | N=308 | N=303 | N=334 | N=294 | |
| | n (%) | n (%) | n (%) | n (%) | n (%) | |
| Male (%) | 156 (52.5%) | 182 (59.1%) | 165 (54.5%) | 194 (58.1%) | 139 (47.3%) | 0.200 ^a |
| Median age in months (IQR) | 7(5-11) | 8 (5-12) | 9(5-14) | 8(6-12) | 9(6-12) | 0.003 ^b |
| No. (%) of patients aged 2-11months ^c | 230 (77.4%) | 218 (70.8 %) | 204 (67.3%) | 244 (73.1%) | 210 (71.4%) | 0.094 ^a |
| No. (%) of patients aged ≥12months | 67 (22.6 %) | 90 (29.2 %) | 99 (32.7%) | 90 (27.0%) | 84 (28.6%) | |
| Median weight in kilogram (IQR) ^d | 7.0 (5.9-8.1) | 7.2 (6.0-8.4) | 7.2 (6.2-8.5) ^c | 7.3 (6.1-8.5) ^c | 7.4 (6.3-8.6) ^d | 0.004 ^b |
| Median duration (IQR) of diarrhoea in days for patients who presented with diarrhoea | 4(3-6) | 3 (2-5) | 3 (2.5-5) | 3(3-5) | 3 (2-5) | 0.016 ^b |

^a Chi square test

^b Kruskal-Wallis test

^c Denominator does not include one patient with missing value

^d Denominator does not include two patients with missing values

Characteristics of patients with severe malnutrition

The female: male ratio was comparable in the pre-intervention and post-intervention periods (p=0.21). The patients in the pre-intervention period tended to be older than those of the post-intervention period (p=0.015). Similarly, patients in the pre-intervention period weighed more than those in the post-intervention period and this difference was of borderline statistical significance (Kruskal-Wallis test, p=0.056) (table 7.6).

Table 7.6: Severe malnutrition patients' characteristics (2005-2009) and comparison of characteristics between the pre-intervention (2005) and post-intervention periods (2009)

| Characteristics | 2005 | 2006 | 2007 | 2008 | 2009 | P-value |
|---|----------------------------|---------------|----------------------------|---------------|---------------|--------------------|
| | N=274 | N=223 | N=246 | N=179 | N=197 | 2005 vs. 2009 |
| | n (%) | n (%) | n (%) | n (%) | n (%) | |
| Male (%) | 130 (47.5%) | 117 (52.5%) | 124 (50.4%) | 79 (44.1%) | 82 (41.6%) | 0.21 ^a |
| Median (IQR) age in months | 14 (10-22) | 12 (9-18) | 12 (9-17) | 14 (9-20) | 13 (9-18) | 0.015 ^b |
| No. (%) of patients aged 6-11months | 87 (31.8 %) | 95 (42.6%) | 107 (43.5%) | 69 (38.6%) | 71 (36.0 %) | 0.33 ^a |
| No. (%) of patients aged group ≥12months ^c | 187 (68.3 %) | 128 (57.4%) | 139 (56.5%) | 110 (61.4%) | 126 (64.0 %) | |
| Median (IQR) weight in kilogram ^d | 6.5 (5.5-8.0) ^c | 6.0 (5.2-7.0) | 6.0 (5.1-7.0) ^c | 6.0 (5.2-7.3) | 6.3 (5.3-7.3) | 0.056 ^b |

^a chi square test

^b Kruskal-Wallis test

^c Denominator does not include one patient with missing value

^d Denominator does not include two patients with missing values

7.2 Effect of the intervention on the process of care indicators comprising the primary outcomes

I will present the analytic results of the effect sizes of absolute improvement in the process of care by comparing the performance of composite indicators of process of care, dichotomised as achieved or not achieved, in the pre-intervention period and the post-intervention period. I have categorized the process of care in four domains i) adequacy of clinical assessment for each of the tracer diseases, ii) classification of the severity of the illness, iii) treatment and, iv) follow-up of patients in the first two days of admission.

The effect size of intervention is measured as the absolute difference in the performance of the composite/key indicators in each domain between the pre-intervention and post-intervention period. For clarity in this thesis, I refer to an effect size of 50% or greater as very large, 20% to 49% as large, 10 to 19% as moderate and below 10% as small. The effect size

will be indicated as positive or negative depending on the direction of the effect. I will also describe performance in the pre-intervention and post-intervention period of the individual tasks that are components of each of the composite indicators to illustrate which individual task influenced the performance of the composite indicators. In this study, I consider performance of quality indicators that is more than or equal to 90% to be excellent performance, 70-89% good performance, 40-69% fair performance and less than 40% poor performance¹⁶. The effect size of intervention on the individual tasks is not calculated since their performance is only used to help explain composite indicator performance.

Examining for confounders: The patients in the pre-intervention and post-intervention period were different in some aspects as illustrated in section 7.1. Before attributing any difference in the outcome to the intervention I used the Mantel-Haenszel (M-H) methods to examine if the association of the intervention with change in an indicator's performance might be confounded by patients' characteristics that differ between the pre-intervention and post-intervention periods. I examined confounding among those characteristics that appeared to demonstrate non-chance variations in distribution across years: 1) sex for pneumonia patients, 2) age, sex, weight, and duration of diarrhoea for diarrhoea cases, and 3) weight and age for severe malnutrition patients. The test results M-H adjustment odds ratio (OR) for fluid management during the pre-intervention and post-intervention periods suggested an interaction effect of patient's age on prescription of fluid therapy for dehydration. The unadjusted OR was 2.7 (95% CI: 1.9-3.8) compared to age adjusted OR of 2.8 (95% CI: 1.8-4.3) among children aged 2-11 months and 7.2 (95% CI: 2.4-21.3) among children aged 12-59

¹⁶ Performance is defined as adherence to best-practice recommendations

months. There was neither confounding nor interaction effect identified for any of the other indicators (appendices 6a-c). Thus, for this case I will present the effect size of the intervention on performance of the indicator for treatment of dehydration stratified for patients' age.

In the following sections, I will describe the effects of intervention on assessment of patients (section 7.2.1), classification of illness (section 7.2.2), treatment practices (section 7.2.3) and finally on the follow-up care (section 7.2.4).

7.2.1 Effects of intervention on assessment practices

In this section, I will present the effect of the intervention on the performance of the composite indicators in the domain 'assessment' for each of the tracer diseases followed by a description of performance of the individual components. The composite indicators define adequacy of assessment of patients based on the assessment of key clinical signs. I considered a patient with pneumonia to be adequately assessed if the following key signs were documented: level of consciousness, cyanosis, ability to drink, lower chest wall indrawing and respiratory rate. Patients with dehydration were considered adequately assessed if level of consciousness, pulse character, ability to drink, sunken eyes and skin turgor were documented. Patients with severe malnutrition were considered adequately assessed if oedema and weight-for-height/length Z-score or visible severe wasting was documented. Operational definitions of these variables are provided in appendices 4a-c.

Performance of composite assessment indicators

Only 1.9% (95% CI 0.6-4.3) patients with an admission diagnosis of pneumonia in the pre-intervention period were adequately assessed compared to 29.0% (95% CI 23.9-34.6) in the post-intervention period. None of the 297 patients with an admission diagnosis of diarrhoea

in the pre-intervention period had adequate assessment; however in the post-intervention period 23.5% (95% CI 18.7-28.7) were adequately assessed. Thus, the intervention produced large effect sizes of absolute improvement of the composite indicators (+27.1%, 95% CI +21.7 to +32.6% and +23.5%, 95% CI +18.6 to +28.3%) related to assessment of pneumonia and dehydration respectively. There was a -4.2% (95% CI -13.2 to +4.8%) absolute change in adequacy of assessment of patients with severe malnutrition however this difference was not statistically significant (p=0.36)(table 7.7). Though the study population included patients whose diagnosis of severe malnutrition was missed during admission excluding these patients from the analysis did not change the results.

Table 7.7: Effects of the intervention on adequacy of assessment

| Tracer disease | Patients adequately assessed in pre-intervention period (2005) | | Patients adequately assessed in post-intervention period (2009) | | Effect size – absolute difference in percentage | |
|---------------------|--|------------------------|---|-----------------------|---|---------|
| | N | n (%;95% CI) | N | n (%;95% CI) | % ; (95% CI) | P-value |
| Pneumonia | 265 | 5 (1.9%; 0.6-4.3) | 293 | 85 (29.0%; 23.9-34.6) | +27.1%; (+21.7 to +32.6) | <0.001 |
| Dehydration | 297 | 0 (0%; N/A) | 294 | 69 (23.5%; 18.7-28.7) | +23.5%; (+18.6 to 8.3) | <0.001 |
| Severe malnutrition | 274 | 120 (43.8%; 37.8-49.9) | 197 | 78 (39.6%; 32.7-46.8) | -4.2 ; (-13.2 to +4.8) | 0.36 |

Performance of individual assessment tasks

The performance of the composite indicators depends on the performance of all the interrelated tasks that define the respective composite indicators. Therefore, in this section, I will explore which of the individual tasks influenced the performance of the composite indicators in the post-intervention period.

Notably, none of the assessment tasks achieved excellent performance (>90%).

Tasks that achieved good performance (70-89%): Four out of the five tasks for assessment of pneumonia achieved good performance in the post-intervention period. These tasks were assessment of level of consciousness (74.4%; 95% CI: 69.0-79.3), cyanosis (75.1%; 95% CI: 69.7-79.9), lower chest-wall indrawing (81.2%; 95% CI: 76.3-85.5%) and respiratory rate (87.0%; 95% CI: 82.6-90.7). Similarly four out of the five tasks for assessment of severity of dehydration achieved good performance: assessment of level consciousness (84.0%; 95% CI: 79.3-88.0), pulse character (85.0%; 95% CI: 80.4-88.9), sunken eyes (71.8%; 95% CI: 66.3-76.8) and skin turgor (71.8%; 95% CI: 66.3-76.8).

Tasks that achieved fair performance (40-69%): Assessment of ability to drink for pneumonia and for diarrhoea patients achieved fair performance ((52.9; 95% CI: 47.0-58.7) and (46.3%; 95% CI: 40.5-52.1) respectively). This cannot be attributed to the complexity of assessment of this sign because I considered either documentation of ability to feed / drink in the clinical history or examination to comprise an assessment. Fair performance might be attributed to failure of the clinicians to understand the appropriateness of this sign in the local context (section 6.2.2).

Tasks that did not achieve significant change in performance: Individual tasks in assessment of severe malnutrition (oedema and severe visible wasting) did not demonstrate significant change and their performance remained fair. There was improvement in weight-for-height/length Z-score recording from 0% in the pre-intervention period to 45/293 (22.8%); however this did not result in better overall performance of the composite indicator.

It is appropriate to assume that all patients included in this study were considered seriously sick by the clinicians as they warranted in-patient care. Assessment of danger signs (signs that predict mortality including level of consciousness, ability to drink, cyanosis for

pneumonia patients and similarly level of consciousness, ability to drink, and peripheral pulse character for diarrhoea patients) is therefore crucial. Assessment of the danger signs remained poor in the post-intervention period for pneumonia (37%; 95% CI: 31-43) as well as for diarrhoea cases (38%; 95% CI: 33-44).

Table 7.8: Effects of the intervention on assessment disease specific key signs

| Tracer disease | Disease specific clinical sign assessed | Number of patients (%; 95% CI) who had the task/indicator achieved | |
|----------------------------|--|--|------------------------|
| | | 2005 | 2009 |
| Pneumonia | | N=265 | N=293 |
| | Level of consciousness | 58 (21.9%; 17.1-27.4) | 218 (74.4%; 69.0-79.3) |
| | Ability to drink ^a | 100 (37.7%; 31.9-43.9) | 155 (52.9; 47.0-58.7) |
| | Cyanosis | 164 (61.9%; 55.7-67.8) | 220 (75.1%; 69.7-79.9) |
| | Lower chest wall indrawing | 49 (18.5%; 14.0-23.7) | 238 (81.2%; 76.3-85.5) |
| | Respiratory rate | 206 (77.7%; 72.2-82.6) | 255 (87.0%; 82.6-90.7) |
| | All danger signs (level of consciousness, ability to drink, cyanosis) assessed | 28 (10.6%; 7.1-14.9) | 109 (37.2; 31.7-43.0) |
| Dehydration | | N= 297 | N= 294 |
| | Level of consciousness | 169 (56.9%; 51.1-62.6) | 247 (84.0%; 79.3-88.0) |
| | Ability to drink ^a | 88 (29.6%; 24.5-35.2) | 136 (46.3%; 40.5-52.1) |
| | Pulse character ^b | 74 (24.9%; 20.1-30.2) | 250 (85.0%; 80.4-88.9) |
| | Sunken eyes | 86 (29.0%; 23.8-34.5) | 206 (70.1%; 64.5-75.2) |
| | Skin turgor | 19 (6.4%; 3.9-9.8) | 211 (71.8%; 66.3-76.8) |
| | All danger signs (level of consciousness, ability to drink, peripheral pulse character) assessed | 28 (9.4%; 6.4-13.3) | 113 (38.4%; 32.9-44.3) |
| Severe malnutrition | | N=274 | N=197 |
| | Weight-for-height/length Z-score /ratio OR visible severe wasting | 161 (58.8%; 52.7-64.6) | 125 (63.5%; 56.3-70.2) |
| | Oedema | 193 (70.4%; 64.7-75.8) | 126 (64.0%; 56.8-70.7) |
| | Visible severe wasting | 161 (58.8%; 52.7-64.7) | 103 (52.3%; 45.1-59.4) |
| | Height | 0 (0%; N/A) | 51 (25.9%; 19.9-23.6) |

^a Patients documented in the history as able to drink were assumed that they did not require to be tested for the ability to drink. Patients documented to have altered consciousness were assumed that they are not able to drink if ability to drink is not documented

^b Patients documented as able to drink or alert were assumed that they are not shocked hence pulse was assumed not weak if pulse character was not documented.

7.2.2 Impact of intervention on the composite indicators for the domain 'classification'

Each of the three tracer diseases had one quality indicator in the domain 'classification'. The indicator was considered achieved if the clinician documented classification of the illness using the terms consistent with ETAT+ syndromic classifications as illustrated in appendix 7.

There was a large improvement in the use of recommended terms for syndromic classification of pneumonia from 16.2% (95% CI: 12.0-21.2) in the pre-intervention to 74.7% (95% CI: 69.4-79.6) in the post-intervention period yielding an absolute effect size of +58.5% (95% CI: +52 to +65). The terms for syndromic classification for dehydration were used in the majority of the records in the pre-intervention period. Yet there was a modest improvement from 74.8% (95% CI: 69.4-79.6) in the pre-intervention period to 90.5% (95% CI: 86.5-93.6) in the post-intervention period with an absolute effect size of +15.7% (95% CI: +9.8 to +21.7).

Clinicians used terms recommended for syndromic classification for severe malnutrition in over three quarters of the records in both the pre-intervention (78.8%; 95% CI: 73.5-83.5) and the post-intervention period (81.2%; 95% CI: 75.1-86.4). The intervention resulted in a small absolute effect size (+2.4%; 95% CI: -0.49 to +9.6) that is not statistically significant ($p=0.52$) (table 7.9).

Table 7.9: Effects of intervention on classification of the illnesses using the terms recommended in ETAT+

| Tracer disease | Patients classified using terms used in the CPGs in the pre-intervention period (2005) | | Patients classified using terms used in the CPGs in the post-intervention period (2009) | | Effect size -- absolute difference in percentage | |
|---------------------|--|------------------------|---|------------------------|--|---------|
| | N | n (% 95% CI) | N | n(% 95% CI) | % ; (95% CI) | P-value |
| Pneumonia | 265 | 43 (16.2%; 12.0-21.2) | 293 | 219 (74.7%; 69.4-79.6) | +58.5%; (+51.9 to +65.2) | <0.001 |
| Dehydration | 297 | 222 (74.8%; 69.4-79.6) | 294 | 266 (90.5%; 86.5-93.6) | +15.7%; (+9.8 to +21.7) | <0.001 |
| Severe malnutrition | 274 | 216 (78.8%; 73.5-83.5) | 197 | 160 (81.2%; 75.1-86.4) | +2.4%; (-0.49 to +9.6) | 0.52 |

7.2.3 Impact of intervention on the composite indicators in the 'domain' treatment.

In this section, I will illustrate the impact of intervention on three major treatment practices, namely dosage of antibiotics prescribed for patients with pneumonia, prescription of intravenous fluid therapy (IVF) for severe dehydration and prescription of feeds for severe malnutrition. Dosage of antibiotics, volume of IVF and feeds within +/-20% of recommended categories in the CPGs were agreed to be within the limits defining 'consistency' with CPGS (Appendix 8). Alongside each composite indicator I have also presented the corresponding individual tasks. Because of the potential confounding of age on treatment for severe dehydration, in this domain I will present results of age-stratified analyses.

Prescription for treatment of pneumonia

For antibiotic prescription practices, I will demonstrate clinicians' adherence to the CPGs by comparing the dosage and frequency of crystalline penicillin and gentamicin prescribed to patients against those recommended in the CPGs.

Prescription of crystalline penicillin: All 265 pneumonia patients in the pre-intervention period were prescribed crystalline penicillin and 98% (287/293) in the post-intervention period. Prescription of crystalline penicillin was considered consistent with CPGs if the dose

was 50,000 IU/kg (+/-20%) six hourly, thus a composite indicator of dose and frequency. In the pre-intervention period 51.7% (95% CI: 45.5-57.9) of patients had crystalline penicillin prescription consistent with CPGs and this improved to 89.9% (95% CI: 85.8-93.1) in the post-intervention period. The intervention produced a large, statistically significant absolute effect size of +38.2% (95% CI: +31.2 to +45.2; $p < 0.001$). The frequency of crystalline penicillin prescribed per day was consistent with CPGs in both the pre-intervention and the post-intervention period in the majority of the records (>98%). Of note is the reduction in number of the children who were prescribed penicillin less than 80% of the recommended dose, a decrease from 39.2% (95% CI: 33.3-45.4) to 2.1% (95% CI: 0.7-4.4) in the pre-intervention and post-intervention periods respectively (Table 7.10).

Prescription of gentamicin: Seventy two percent (191/265) and 48% (140/293) of patients with pneumonia were prescribed gentamicin on admission in the pre-intervention and post-intervention periods respectively. Prescription of gentamicin was considered consistent with CPGs if the dose was 7.5mg/kg (+/-20%) once a day, a composite indicator of dose and frequency. Prescription of gentamicin consistent with the CPGs was observed in only 19.9% (95% CI: 14.5-26.3) of the records during the pre-intervention period. The intervention produced a very large absolute effect size of +68.0% (95% CI: +60.1 to + 75.8) of absolute improvement in the composite indicator. This effect is attributed to improvement in the prescription of gentamicin at the recommended frequency of single daily dose in the post-intervention period (98.6%; 95% CI: 94.9-99.8) compared to the performance in the pre-intervention period (24.1%; 95% CI: 18.2-30.8) (Table 7.10).

Table 7.10: Effects of intervention on pneumonia treatment practices.

| Treatment indicators | Patients whose treatment was consistent with CPGs in the pre-intervention period (2005) | | Patients whose treatment was consistent with CPGs in the post-intervention period (2009) | | Effect size - difference in percentage | |
|---|---|------------------------|--|-------------------------|--|----------------------|
| | | | | | % (95% CI) | P-value ^a |
| | N | n(%; 95% CI) | N | n (%; 95% CI) | | |
| Dose (80-120%)and freq of crystalline penicillin consistent with CPGs | 265 | 137 (51.7%; 45.5-57.9) | 287 | 258 (89.9%; 85.8 -93.1) | +38.2%; (+31.2 to +45.2) | <0.001 ^a |
| Patients who received less than 80% of the recommended dose of crystalline penicillin | 265 | 104 (39.2%, 33.3-45.4) | 287 | 6 (2.1%; 0.7-4.4) | | |
| Dose (80-120%)and frequency of gentamicin consistent with guidelines | 191 | 38 (19.9%; 14.5-26.3) | 140 | 123 (87.9%; 81.3-92.8) | +68.0%; (+60.1 to +75.8) | <0.001 ^a |
| Frequency of gentamicin consistent with ETAT+ guidelines | 191 | 46 (24.1%; 18.2-30.8) | 140 | 138 (98.6%; 94.9-99.8) | | |

^a Chi square test

Prescription for intravenous fluid therapy for dehydrated patients controlled for age

For dehydration therapy I will use the choice of fluid, volume of fluid, duration of fluid therapy in relation to the age group of the child (patients aged 2-11 months and patients aged 12-59 months) to demonstrate adherence to the CPGs. I have stratified the analysis by age to control for its potential influence on treatment practices; therefore I have presented stratum specific effect sizes of absolute change in performance of this indicator.

The absolute effect size of intervention on the composite indicator fluid therapy for patients aged 2-11 months was +24.1% (95% CI: +14.8 to +33.3) while the effect of intervention for patients 12-59 months was +30.0% (95% CI: + 17.6 to +42.4). The improvement in performance of the composite indicator in both age categories appears to be due to improvement in the volume of IVF prescribed and duration of the IVF infusion (table 7.11).

Table 7.11: Effect size of intervention on the composite indicators in the domain 'treatment' and the performance of specific tasks stratified for age ^a.

| | Treatment task | Number of patients (%; 95% CI) whose treatment was consistent with ETAT+ guidelines | | absolute effect size - difference in percentage % (95% CI) | p-value ^b |
|---------------------------|---|---|------------------------|---|----------------------|
| | | N=200 | N=204 | | |
| patients aged 2-11 months | IVF for plan C consistent with ETAT+ guidelines (80-120%) | 95 (47.5%; 40.4-54.6) | 146 (71.6%; 64.9-77.7) | +24.1; (+14.8 to +33.3) | <0.001 ^b |
| | Choice of IVF | 171 (85.5%; 79.8-90.0) | 180 (88.2%; 83.0-92.3) | | |
| | Volume of IVF (80-120%) | 128 (64.0%; 56.9-70.7) | 155 (76.0%; 69.5-81.7) | | |
| | Duration of IVF | 137 (68.5% 61.6-74.9) | 173 (84.8%; 79.1-89.4) | | |
| patients aged >12 months | | N=64 | N=82 | | |
| | IVF for plan C consistent with ETAT+ guidelines (80-120%) | 5 (7.8%; 2.6-17.3) | 31 (37.8%; 27.3-49.2) | +30.0%; (+17.6 to +42.4) | <0.001 ^b |
| | Choice of IVF | 48 (75.0%; 62.6-85.0) | 71 (86.6%; 77.3-93.1) | | |
| | Volume of IVF (80-120%) | 31 (48.4%; 35.8-61.3) | 50 (61.0%; 49.6-71.6) | | |
| | Duration of IVF | 9 (14.1%; 6.6-25.0) | 40 (48.8%; 37.6-60.1) | | |

^a 22 records for 2005 and 3 for 2009 were excluded in the analysis for treatment due to serum sodium >145 or <135 mmol/l. In addition 11 and 5 records in 2005 and 2009 respectively were excluded because there was no evidence that IV fluid was continued on the ward and diagnosis of either some dehydration or no dehydration was made.

^b Chi square test

Prescription of feeds for severe malnutrition

Majority of patients (>85%) had feeds prescribed on admission in both the pre-intervention and post-intervention periods. The performance of the composite indicator for quality of feed prescription was poor (9.1%; 95% CI: 6.0-13.2) in the pre-intervention and improved to 68.5% (95% CI: 61.5-74.9) in the post-intervention period, a very large absolute effect size of +59.5% (95% CI: +52.1 to +66.7). This is attributed to improvement in choice of feeds and the volume of feeds in the post-intervention period from 13.3% (95% CI: 9.2-18.4) and 53.2% (95% CI: 47.0-60.2) in the pre-intervention to 80.7% (95% CI: 74.1-86.2) and 89.8% (95% CI: 84.3-93.8) in the post-intervention period respectively (Table 7.12).

Table 7.12: Effect size of intervention on the composite indicators in the domain 'treatment' and the performance specific indicators

| Treatment task | Patients whose treatment was consistent with CPGs | | Patients whose treatment was consistent with CPGs | | absolute effect size - difference in percentage | |
|--|---|------------------------|---|------------------------|---|----------------------|
| | | | | | % (95% CI) | P-value ^a |
| | N | n (% ;95% CI) | N | n (% ;95% CI) | | |
| Feed prescription consistent with CPGs | 274 | 25 (9.1%; 6.0-13.2) | 197 | 135 (68.5%; 61.5-74.9) | +59.5%; (+52.1 to +66.7) | <0.001 |
| Feeds prescribed | 274 | 233 (85.0%; 80.3-89.0) | 197 | 176 (89.3%; 84.2-93.3) | | |
| Choice of feed | 233 | 31 (13.3%; 9.2-18.4) | 176 | 142 (80.7%; 74.1-86.2) | | |
| Volume of feeds (80-120%) consistent with CPGs | 233 | 124 (53.2%; 47.0-60.2) | 176 | 158 (89.8%; 84.3-93.8) | | |

^a Chi square test

7.2.4 Impact of intervention on the indicators in the domain 'follow-up of patients'

This section refers to care of patients during the first two days of admission on the wards. I will focus on two aspects of care: i) administration of prescribed treatment and ii) review of patients' progress by the nurses and doctors. I acknowledge that ETAT+ course materials and CPGs do not cover aspects on follow-up care and their performance in the

post-intervention period may not directly reflect the impact of ETAT+ training. Follow-up care is, however, an important component of patient's care and was of interest to the hospital staff as agreed during the consensus development process of quality of care indicators. The quality indicators agreed upon by KNH staff are therefore used as the reference standards of care (Appendices 2a-c). These 'best-practices' in the follow-up care were introduced and promoted as intervention components during the period of participatory action research. Thus, the performance of indicators in this domain gives an insight of the impact of strategies used to reinforce uptake of best-practices that were introduced as 'new practices' during the period of participatory research. These indicators are also the first ones to capture aspects of nursing care and tasks influenced by collective efficacy of the care-providers.

Administration of treatment

I have considered administration of crystalline penicillin for patients with admission diagnosis of pneumonia, intravenous fluid (IVF) monitoring for children with dehydration and monitoring of intake of feeds for the severely malnourished children as key treatments for the study population. Evidence was sought that the treatment prescribed was given in the initial 48 hours from the treatment charts, fluid charts and feed charts. The analysis of performance of these indicators is restricted to analysis that is feasible and reliable in the face of poor documentation of time of events. For example, timeliness of initiation of treatment could not be analysed because of health workers' failure to enter time of events in the patients' medical records. Operational definitions of the tasks related to administration of treatment are given in Appendix 9.

Administration of crystalline penicillin: Children within the age-group of the study population should receive eight doses of crystalline penicillin in the first 48 hours of admission. The performance of this quality indicator was poor in both the pre-

intervention and post-intervention periods with only 13.0% (20/154; 95% CI: 7.6-18.4) and 16.6% (31/187; 95% CI: 11.2-22.0%) respectively documented as receiving the full eight doses on the wards. This produced a statistically insignificant small effect size of +3.6% (95% CI: -3.9 to +11.1) of absolute improvement ($p=0.35$). However, the median number of doses of crystalline penicillin (IQR) documented as given increased from 5.5 (4.5-7) to 6.5 (5.5-7.5) in the pre-intervention and post-intervention period respectively, a difference that was likely to be by chance (Kruskal Wallis $p=0.54$).

Administration of intravenous rehydration therapy and feeds for severe malnutrition:

Monitoring of administration of intravenous fluid (IVF) for severe dehydration and feeds for the severely malnourished children and reassessment of children after fluid therapy were all considered to be indicators of quality care by KNH staff. There was a statistically significant difference in performance of these three indicators in the pre-intervention and post-intervention periods that I do not consider to be of clinical significance. None of these indicators achieved greater than 10% performance in the post-intervention period (table 7.13). In the pre-intervention period none of the patients on fluid therapy was documented as reviewed by a clinician after fluid therapy and there was minimal improvement (10%, 95% CI: 6-14%) in documenting this task in the post-intervention period.

In over 80% of the medical records of children with malnutrition, there was no evidence in both the pre-intervention and post-intervention period that a feed chart was used in the first two days of admission.

Table 7.13: Effect of intervention on the administration of the prescribed treatment

| Task in administration of treatment | Patients who had the task achieved 2005 | | Patients who had the task achieved 2009 | | effect size - difference in percentage | |
|--|--|-----------------------|--|-----------------------|--|--------------------|
| | N | n (%;95% CI) | N | n (%;95% CI) | % [95% CI] | p-value |
| Evidence that 8 doses crystalline was given in the first 48hrs for children with pneumonia ^c | 154 | 20 (13.0%; 7.6-18.4) | 187 | 31 (16.6%; 11.2-22.0) | +3.6% (-3.9 to +11.1) | 0.36 ^a |
| Median doses of crystalline penicillin (IQR) given in the first 48hrs for children with pneumonia ^c | 154 | 5.5 (4.5-7.0) | 187 | 6.5 (5.5-7.5) | | 0.54 ^b |
| Intravenous fluid therapy for severe dehydration monitored ^d | 285 | 2 (0.7%; 0.9-2.5) | 285 | 16 (5.6%; 3.2-9.0) | +4.9% (+2.1 to +7.8) | 0.001 ^a |
| Patients on IVF therapy who were reassessed after plan C | 272 | 0 (0%;0-1.3) | 281 | 27 (9.6 %; 6.4-13.7) | | |
| Patients with severe malnutrition that had feeds prescribed and whose feeds intake was documented in the feed chart ^e | 223 | 3 (1.3%; -0.2 to 2.9) | 170 | 13 (7.6%; 3.6-11.7) | +6.3% (+2.0 to +10.6) | 0.002 ^a |
| Evidence that feed chart was used on the first 2 days of admission ^e | 223 | 17 (7.6%; 4.1-11.1) | 170 | 29 (17.1%; 11.3-22.8) | | |

^a Chi square test,

^b Kruskal Wallis test

^c Analysis restricted to those alive after 2 days, crystalline penicillin prescribed as four times a day and not stopped during the first 2 days of admission.

^d Analysis restricted to those with evidence that intravenous fluid (IVF) was prescribed on the ward and were alive after one day of admission.

^e Analysis restricted to those who had feed prescribed and were alive after 1 day of admission.

Follow-up of critically sick patients

Due to the inadequacy of documentation of clinical presentation of patients, I defined a critically sick patient requiring regular review by nurses and clinicians as those patients who died within five days of admission. Data for patients who died on the day of admission were excluded from this analysis as they are unlikely to have accumulated adequate data to draw conclusions on this aspect of care. Therefore, results are provided for 93 patients and 45 patients who died within one to five days during the pre-intervention and post-intervention periods respectively. I have combined the data on review of the critically sick patients for the three tracer diseases as the indicators apply to all the tracer diseases equally.

Nurses' follow-up of critically sick patients: Though it is recommended that all seriously sick patients are reviewed by the nurses every four hours, KNH staff agreed that nurses' review should be at least 6 hourly and during the reviews the vital signs such as pulse rate, respiratory rate and temperature should be recorded. Yet, documentation of the vital signs of the critically sick patients in nurses' notes (cardex) was hardly done (<10%) in both the pre-intervention and post-intervention period (Table 7.14).

Clinicians' follow-up of critically sick patients: As per the quality indicators agreed upon by KNH staff seriously sick patients should also be reviewed, with documentation of this review, at least twice a day by a clinician. Performance of this indicator for the critically sick patients was poor in the pre-intervention (4.3%; 95% CI: 1.2-10.6) and post-intervention (4.4%; 95% CI: 0.5-15.1) periods. Review of these patients by a clinician within 6 hours of death remained poor during pre-intervention (22.6%; 95% CI: 14.6-32.4%) and post-intervention period (37.8%; 95% CI: 23.8-53.5).

In brief, follow-up care of the critically sick patients remained poor throughout the study period as depicted in table 7.14.

Table 7.14: Effect of intervention on health workers' regular review of the critically sick patients

| Composite task | Individual task | Patients who had the task/indicator achieved (2005) | Patients who had the task/indicator achieved (2009) | effect size - difference in percentage | |
|---|---|---|---|--|----------------------|
| | | N=93 | N=45 | | |
| | | n (% ;95% CI) | n (% ;95% CI) | % [95% CI] | P-value ^c |
| Nurses' review of the critically sick patients in the first 48hrs of admission ^a | 6hourly review of vital signs documented ^b | 1 (1.1%; 0.0 to -5.8) | 3 (6.7%; 1.4-18.2) | +5.6% (-2.0 to +13.2) | 0.066 |
| | Temperature documented ^d | 1 (1.1%; 0.0 to -5.8) | 3 (6.7%; 1.4-18.2) | | |
| | Respiratory rate documented ^d | 1 (1.1%; 0.0 to -5.8) | 3 (6.7%; 1.4-18.2) | | |
| | Pulse rate documented ^d | 1 (1.1%; 0.0 to -5.8) | 3 (6.7%; 1.4-18.2) | | |
| Clinicians' review of the critically sick patients ^a | Review of the critically sick patients 12hrly in the first 48hrs of admission | 4 (4.3%; 1.2-10.6) | 2 (4.4%; 0.5-15.1) | 0.1% (-7.2 to +7.4) | 0.96 |
| | Clinicians review 6hrs before death | 21 (22.6%; 14.6-32.4) | 17 (37.8%; 23.8-53.5) | | |

^a Analysis restricted to patients who died within 5 days of admission but were alive on the first day of admission

^b Temperature, pulse rate and respiratory rate

^c Chi square test

^d In the nurses cardex or observation at least 6 hourly

7.3 Trend of change of performance of the composite indicators

The plausibility of attributing change of performance of the key indicators to the intervention is increased if the changes observed in a dynamic model are demonstrated to be related to intensity or timing of intervention. This is explored further in the analysis of data collected during the period of participatory action research as illustrated in chapter 5. In this section, I will explore the effect of intensity of intervention on the quantitative indicators acknowledging that this is a *post-hoc* explanation. Though some of the patients' characteristics described in section 7.1.2 varied across the study period

(2005-2009), the Mantel–Haenszel test did not suggest potential confounding associations of the patients' characteristics and the intervention on outcomes (data not shown).

The quality indicators for the follow-up care are not included in this analysis. Therefore I will illustrate trend of 12 quality indicators. I will present yearly trend of performance followed by a further exploration of the trends of six monthly performances.

Overview of trends of performance change over 5 year period (2005-2009)

All the composite indicators in the domain assessment, classification and treatment that showed statistically significant improvement in the post-intervention period compared to the pre-intervention period also showed statistically significant trends in yearly improvement assessed over the course of the entire study period that was unlikely to be by chance. These composite indicators include adequacy of pneumonia assessment (chi square for trend $p < 0.001$), adequacy of dehydration assessment ($p < 0.001$), pneumonia classification ($p < 0.001$), diarrhoea classification ($p < 0.001$), crystalline penicillin prescription ($p < 0.001$), gentamicin prescription ($p < 0.001$), fluid therapy ($p < 0.001$), and feed therapy ($p < 0.001$). The composite indicators related to assessment and classification of severe malnutrition did not show any significant change influenced by the intensity of ETAT+ training ($p = 0.51$, $p = 0.75$ respectively). The indicator related to assessment of malnutrition had a consistently poor performance throughout the entire period.

Exploration of trend of change

For the composite indicators that showed improvement over time, the improvement was not linear and was characterized by improved and occasionally even declining performance. Furthermore, the response of the indicators to intervention was different; with some of the indicators showing a rapid response while others showed a delayed response. I have therefore, attempted to explore the trend of change in greater depth by displaying the six monthly mean performances of the indicators graphically with bars indicative of the 95% confidence intervals around an estimate of the mean performance.

In attempting to relate the performance of quality of care indicators to intensity and coverage of ETAT+ training I divide the entire study into four periods i) Period 0 - pre-intervention period from January to December 2005 ii) Period 1 - piloting of ETAT+ training materials from January to December 2006, iii) Period 2 - formal ETAT+ training from January 2007 to June 2008, iv) Period 3 - period of participatory action research (PAR)¹⁷ from July 2008 to December 2009. Improvement (or deterioration) within period 0 is considered of potential interest if two 95% CI of the mean performance of the quality indicator do not overlap. Similarly, improvement (or deterioration) in period 1 is considered to be significant if any of the two error bars of 95% CI of the mean performance do not overlap with any of those in period 0. Finally, improvement (or deterioration) in period 2 and 3 are considered significant if at least one error bar of the mean is distinct from all the error bars in the periods 0 and 1.

Period 0 response. Performance of indicators for prescription of gentamicin for pneumonia and prescription of feeds for severely malnourished patients demonstrated a

¹⁷ Activities, such as audit and feedback and tailored educational sessions, to promote uptake of best-practices were introduced in the study hospital during this period in a participatory approach.

significant improvement in period 0. This rapid response may be due to the effect of the Child Health Evidence Week in June 2005, a forum in which importance of prescribing correct drug dosages was highlighted. Alternatively the improvement in performance was not related to intervention at all. The former argument is supported by the fact that further analysis of the trend of change by displaying the quarterly mean performances of the two indicators with 95% confidence intervals showed a clear change in performance between quarter 2 and quarter 3 of 2005 (not displayed). It appears that clinicians recognized the need to change prescription habits and the early adopters implemented change rapidly. Both indicators showed further improvement in period 2 suggesting that ETAT+ training had a role in improving their performance as illustrated on example of gentamicin prescription (Figure 7.1). The activities during the PAR did not have a significant effect on the dosing of gentamicin. Surprisingly, a significant deterioration was observed in the performance of feed prescriptions (appendix 10). I attributed the later effect to contextual factors.

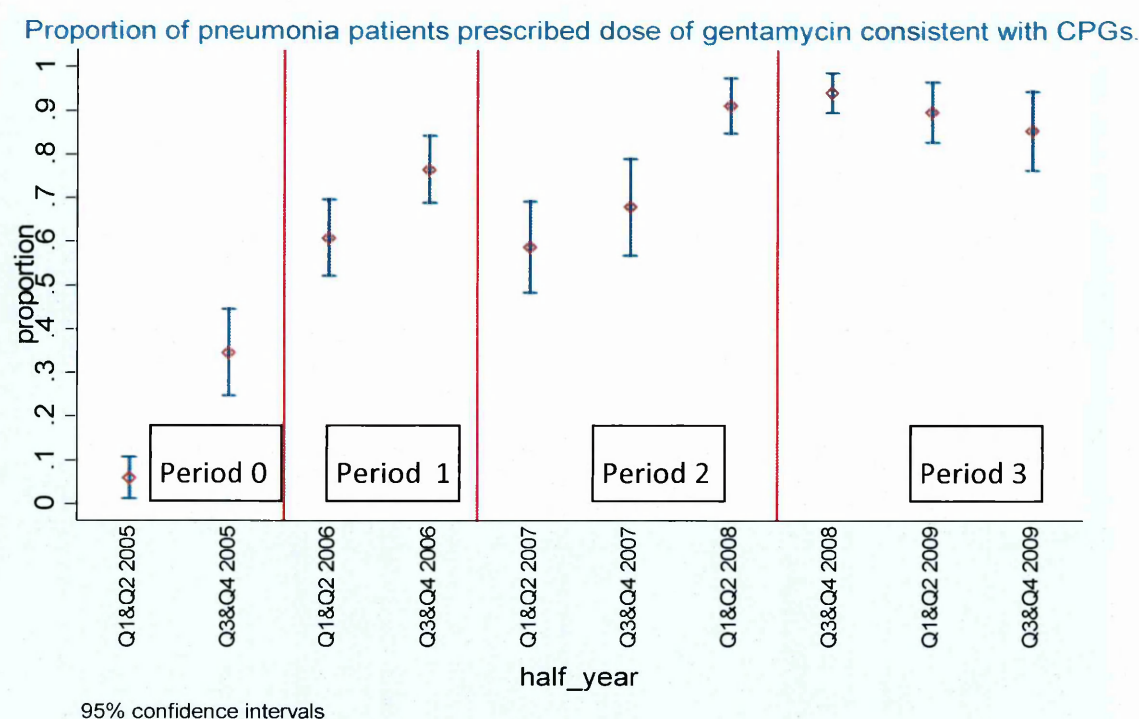


Fig 7.1: Trend of change for six monthly mean (95%CI) performance for prescription of gentamicin for pneumonia patients with varying intensity of intervention

Period 1 response: Prescription of crystalline penicillin for pneumonia patients showed rapid response to the intervention in period 1. The improvements may have been triggered by the awareness of the correct dosage created during Child Health Evidence Week in June 2005 but this achieved significant improvement only in period 1, perhaps indicating enhancement of change linked to the piloting of the ETAT+ training with small-scale distribution of CPGs booklets and under the influence of early adopters. In comparison to gentamicin and feed prescriptions which had relatively poor baseline performance, prescription of crystalline penicillin had fair baseline performance, with less room for improvement suggesting that potential early adopters' prescriptions were already consistent with the WHO guidelines (from which CPGs are derived). This performance was maintained during the rest of the study period and no further improvement were observed in period 2 and 3 as illustrated in figure 7.2. No other indicators showed an initial response in this period.

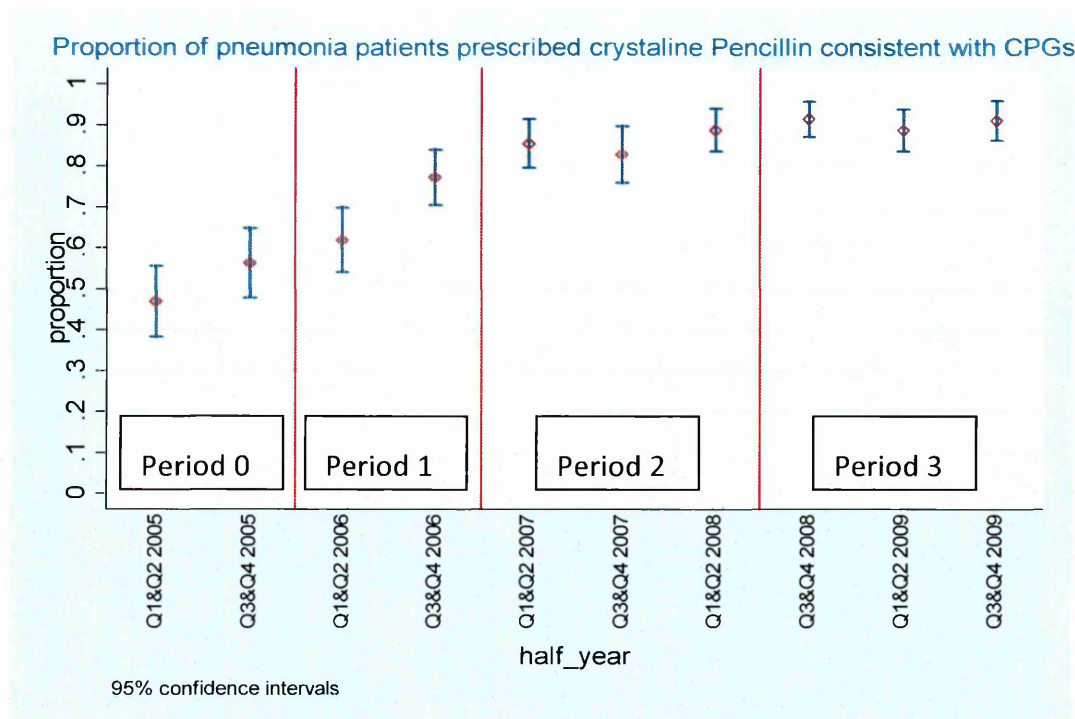


Fig 7.2: Trend of change for six monthly mean (95%CI) performance for prescription of crystalline penicillin for pneumonia patients with varying intensity of intervention

Period 2 response: Five of the 12 composite indicators showed initial response in period 2. These included all the three indicators for the diarrhoea management (assessment, classification and fluid prescription) and two indicators for pneumonia management (assessment and classification). Only the indicators for assessment and classification of pneumonia showed a further significant improvement in performance in the period of PAR, while the others maintained the performance until the end of this study. Figure 7.3 depicts trend change in the performance of indicator for classification of pneumonia patients. The trend of the other four indicators that showed the initial response period 2 is illustrated in appendices 11 a-d.

The improvement in period 2 may be attributed to the gradual rolling out of formal ETAT+ training linked to dissemination of the CPGs booklets. This may imply that the clinicians required knowledge and skill enhancement. The difference in performance of the

different indicators during the PAR underscores the complexity of contextual factors that influence performance.

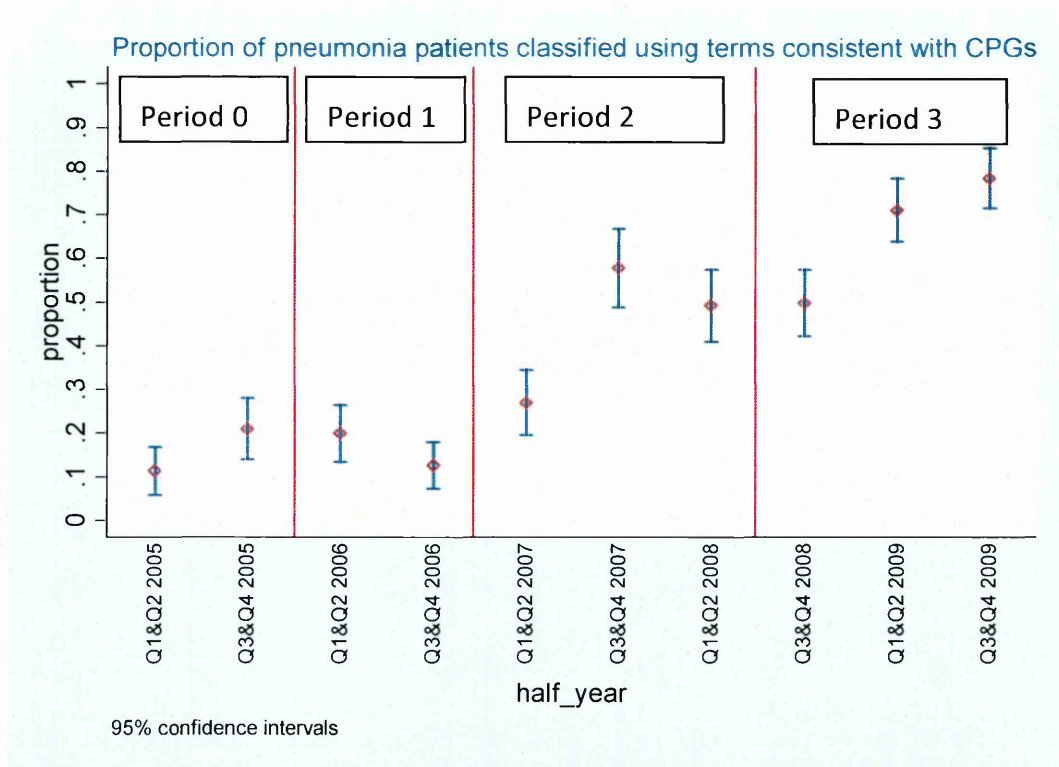


Fig 7.3: Trend of change for six monthly mean (95%CI) performance for classification of pneumonia patients with varying intensity of intervention

Period 3 response: At the commencement of the PAR four indicators had not shown any improvement in performance. Despite attempts to promote uptake of the best-practices during the PAR only one of these indicators, monitoring of administration of intravenous fluid therapy, improved though the performance was still poor at the end of the study period (figure 7.4). However, an augmented response during this period was observed for two indicators (assessment and classification of pneumonia) that showed prior response (appendices 11a and Fig 7.3).

This suggests that the absolute effect sizes assessed as the differences in the performance of the indicators between 2005 and 2009 represented an accumulation of effects of ETAT+ training. Further reinforcement strategies often sustained or perhaps built on gains

of previous ETAT+ trainings rather than increasing the breadth of improvement in quality. These finding questions the role of CMEs and audit and feedback in improving adherence to CPGs.

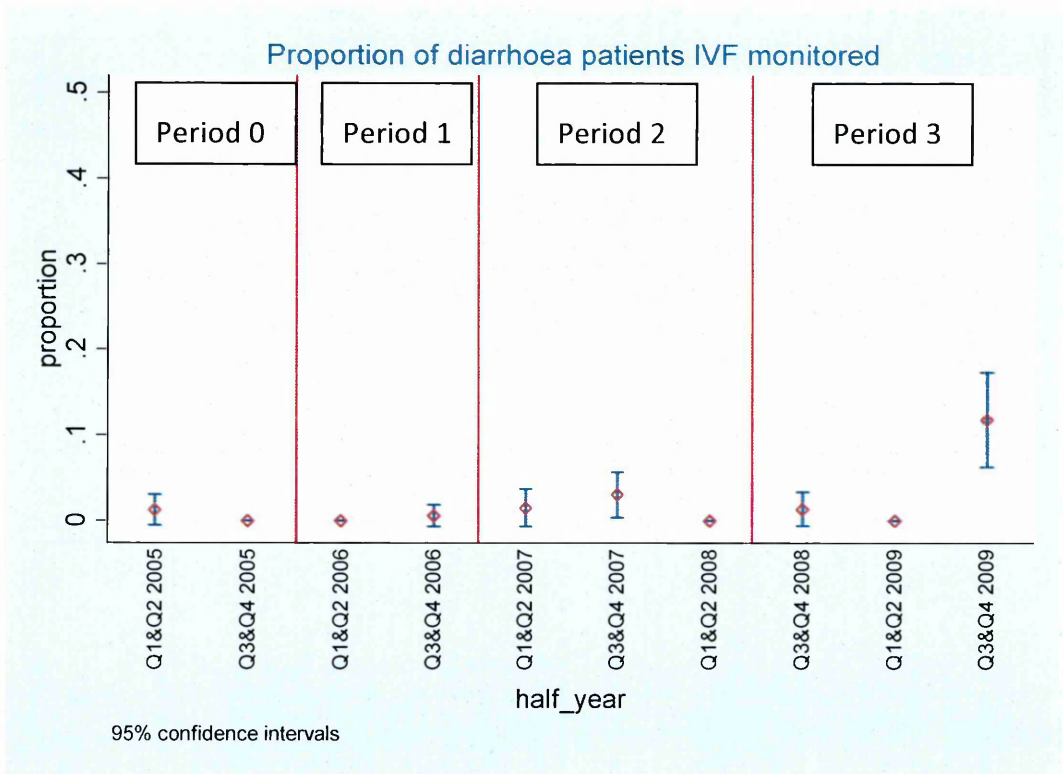


Fig 7.4: Trend of change for six monthly mean (95%CI) performance of monitoring of IVF for diarrhoea patients with varying intensity of intervention

Non-responsive indicators: Four indicators of the 12 indicators did not show significant improvement during the five year period (2005-2009). These include assessment and classification of severe malnutrition, administration of crystalline penicillin and monitoring of intake of feeds for the malnourished children. Among them only classification of severe malnutrition had good performance in the pre-intervention period. I use the indicator of assessment of severe malnutrition to illustrate performance of non-responsive indicators (Fig 7.5). The trend of the other non-responsive indicators is depicted in appendices 12 a-b.

This pattern suggest that these four indicators were not sensitive to any of the strategies, such as ETAT+ trainings, CMEs, audit and feedback, used in this thesis to improve performance. I did not identify common features specific for this group of indicators that could explain this unexpected pattern.

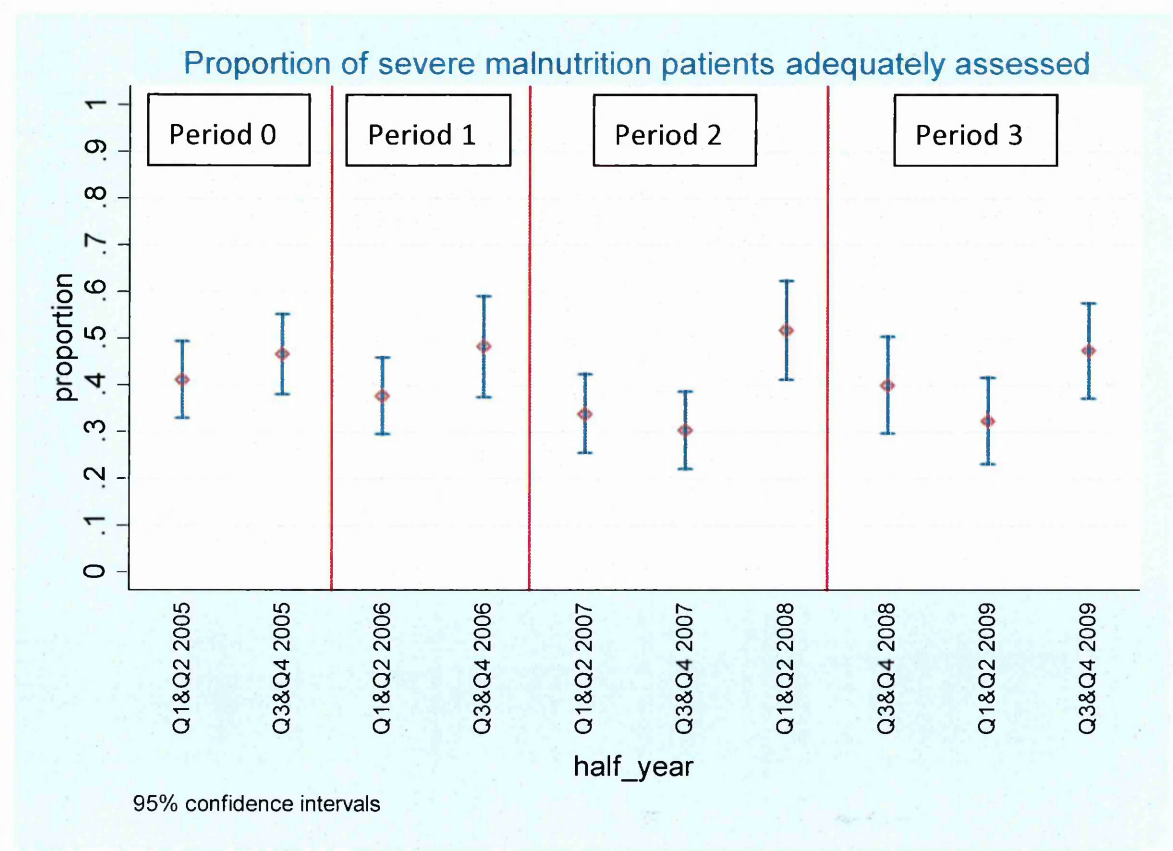


Fig 7.5: Trend of change for six monthly mean (95%CI) performance for adequate assessment of severe malnutrition with varying intensity of intervention

In summary, the response of the performance of the quality indicators to ETAT+ training and the activities during the PAR that included CMEs and audit and feedbacks was largely unpredictable. This suggests complexity of interaction of other factors in the context other than the planned activities to promote uptake of the CPGs and in determining the health workers performance.

7.4 Conclusion

The findings described in this chapter show that before the intervention, care was largely inconsistent with best practice recommendations. Out of 17 key indicators only three had baseline performance of over 50% (crystalline penicillin dose, classification for severe malnutrition and classification for dehydration), while 9 of them had performance below 10%. The intervention had an absolute effect size of over 20% in eight of the 17 key indicators, with three of them having an absolute effect size of over 50% (pneumonia classification, gentamicin dosage and prescription for feeds of the malnourished). In total for six of the 17 indicators a performance of over 70% was achieved after the intervention, while for only one indicator (classification of dehydration) the performance of over 90% was achieved. The intervention had modest to very large absolute effect size ($> + 10\%$) for all indicators that reflected admission clinicians' practices except for assessment of malnutrition. However, all the key quality indicators in the follow-up domain achieved performance of less than 10% in the post-intervention period.

Examining the trends for changes of the key indicators in six monthly periods from 2005-2009 showed that the adoption of best practices displayed no consistent pattern with the effect of ETAT+ training and the action research component's effect was unpredictable.

Chapter 8

Drawing Meaning From My Body of Work

In previous chapters I have presented results arising from relatively focused approaches to enquiry examining implementation of ETAT+ recommendations in KNH. When I first began to try and draw insights from the quantitative results using component parts of the qualitative results as the lens, I found difficulty in developing a holistic understanding. Instead I found it useful to 'step-back' from the specific findings and use an epistemological perspective, informed by my experience in different roles during this PhD thesis (section 4.2.2.1), together with the *whole* interconnected qualitative data as a lens to help understand the successes and failures observed. This approach led me to recognise the importance of the organisation within which the work took place and how this was socially constructed. In attempting a more holistic analysis I decided to abandon the conceptual PRECEDE-PROCEED model that was originally used to guide the conduct of the intervention, generation of data and, to a degree, inform its analysis, finding it poorly suited to the current purpose. The insights I now present point to the value of a wider body of theory as a means to elicit a better understanding of the factors influencing why the ETAT+ recommendations were or were not taken up.

8.1 Value of wider body of theory

In this section, I will give an account of KNH as a system and the value of new theories used to understand the system.

Kenyatta National Hospital as a context

KNH as an organization has a unique configuration. This can be described with reference to its structures, strategies, culture, values and goals, all of which relate to organizational attributes. However, Chia argues that organizations develop from interactions of concrete individuals and organizational realities that are very much a product of the social

constructions of these individual agents (Chia 2003). Drawing on this argument, I argue that in this PhD thesis I have concentrated on individual agents (or group) meanings and intentions, interpretation and sense making to throw light on the life of the social structure.

In this integrated analysis, I considered KNH as a 'system' that exists in the natural world. A system is defined as the coming together of parts, interconnections and purpose (Plsek 2001). In the focused qualitative research, I broke the system down into component parts that I discussed independently (chapter 6), though perhaps the real power lies in understanding the way the parts come together and are interconnected to fulfil some purpose. Thus, the system is not a machine. Its malfunction cannot be adequately analyzed by breaking it down to components and considering each in isolation (Wilson and Holt 2001). Similarly, while the quantitative research results depict case management broken down into components studied independently, the real meaning of case management lies in the way the components come together and are interconnected for the purpose of overall patient management. Therefore, although I found it useful to understand specific units or components of the intervention by way of initial exploration of this system the question that arose (to explain failures) was: 'What is malfunctioning at the unit level and how does the interrelatedness of units contribute to the malfunction of the overall system?' In an attempt to answer these questions, I have used the agentic perspective of social cognitive theory to help understand the individual professionals' behaviour, and complexity science theories to help understand the inter-relationship between agency and structure. These theories provided me with an important and much broader framework as I tried to understand the data more deeply and to develop a deeper understanding of my findings. I acknowledge that structure can define the scope of an agent's ability to act and agency may also have the ability to change the structure.

The value of new theory

The social cognitive theory (SCT) has been used in guideline implementation research (Cabana, S et al. 1999; McDermott 2010). The theory posits that the human mind is self-organizing, proactive, self-reacting and self-regulating, not just reactively shaped by environmental forces or driven by impulses. In this PhD thesis, I argue that the health professionals are agents generating experiences rather than simply recipients of experiences. Efficacy beliefs are the foundation of human agency (Bandura 1989; Bandura 2001). Perceived self-efficacy refers to beliefs in one's capabilities to organize and execute the course of action required to manage prospective situations (Bandura 2002). Efficacy beliefs are the product of a complex process of self-persuasion that relies on the cognitive processing of diverse sources of efficacy information. These have been described by Bandura, in order of importance, as performance of mastery experiences, vicarious experiences, verbal persuasion and physiological and, emotional influences (Bandura 1989; Bandura 2002). Efficacy beliefs affect adaptation and change not only in their own right but through their impact on other determinants. Bandura argues that such beliefs influence whether people think pessimistically or optimistically, ways of self-enhancing or self-hindering, choice of challenges to undertake, effort to expend in the endeavour and how long to persevere in the face of obstacles and failures (Bandura 2001). This argument suggests that efficacy beliefs influence self-regulation of motivation through goal challenges and outcome expectation. In this way, people are said to adopt internal standards and regulate their actions based on continuous self-evaluation, such as doing things that give them self-satisfaction and self-worth. Efficacy beliefs thus influence how obstacles and impediments are perceived. However, peoples' actions (or inaction), may be bound, at least initially by social rules, that agents must overcome to truly achieve changes, thus agents can ultimately change aspects of structure too.

Complexity theories are concerned with the emergence of order in dynamic, non-linear systems which are constantly changing and where laws of cause and effect initially appear not to apply. Burnes argues that order in such a system is seen to manifest in a largely unpredictable fashion in which patterns of behaviour emerge in irregular but similar forms through a process of self-organization (Burnes 2005). Such non-linear systems produce unpredictable outcomes in part because of their sensitive dependence on the initial conditions, that is, they are influenced by historical contingencies.

I acknowledge there are many competing theories in the science of complexity; however, I feel that complex adaptive systems (CAS) theory is most appropriate for my thesis. CAS often exhibit self-organization, that is, work processes and daily patterns of interactions among the agents cause the system to self-organize and a structure to emerge without hierarchical control or prior shared intentions of the agents operating within it, or even contrary to intentions. Self-organization is underpinned by a set of simple order-generating rules (Burnes 2005). However, agents operate under a set of rules that change over time as they gain experience through encounters with the environment and with each other. In addition, in CAS, negative feedback works by reversing the direction of change of some variables while positive feedback increases the rate of change of other variables. As CAS consists of a large number of agents, each of which behaves according to their own principles of local interaction, each agent adjusts their behaviour to that of other agents (feedback loops). The systems produced remain in a state between order and disorder referred to as the edge of chaos, they don't quite settle into a state of equilibrium and never quite fall apart.

In contrast, chaos describes an unpredictable and orderly disorder in which patterns of behaviour unfold in irregular but similar forms. According to the science of complexity the irregular behaviour occurs because the environment bombards organizations with events

that agents within them have not foreseen or cannot deal with (Stacey 1995). Chaos theory thus focuses on the whole system and population as opposed to the CAS approach that seeks to understand the behaviour of individual elements of the systems and population.

In this PhD thesis, the adoption of the best-practices was not linear; rather it was largely unpredictable, characterized by variable decision-adoption periods and variable adoption rates. The issue here is that implementation success is complex and determined by multiple causes that may interact in a non-additive fashion. Plsek et al argue that the only way to know exactly what a complex system will do is to observe it, rather than focus on better understanding of the agent, or better models, or more analysis (Plsek and Greenhalgh 2001). The participant observation carried out in this PhD thesis exposed the hidden differences in the initial conditions that lead to diverging system reactions and unpredictable results. It also illuminated the hidden or poorly articulated values or needs that influenced the practitioners' and organizational behaviour. While acknowledging the risk of bias in the interpretation of these results given my background as a clinician, I argue that engaging in reflexivity with myself and others contributed to greater awareness of how this knowledge, or my understanding of the situation, was produced regardless of my epistemological orientations (Gerstl-Pepin and Patrizio 2009).

In this section, I will therefore attempt to explore the complex and dynamic interaction between the contexts (chapter 3), interventions (chapter 5), health workers' performance (Chapter 7) and, barriers to and facilitators of uptake of best- practices (Chapter 6). Using these data, my participatory experiences and insights available to me as an 'insider', I attempted to address the overarching question of: what seemed to work and for whom, and why did it appear not to work in other situations? Here, I therefore provide an additional ethnographic lens through which to examine the implementation of ETAT+

recommendations and subsequent changes in practice informed by my increasing breadth of knowledge based on the newly adopted theories. I have not attempted to convey everything I learnt during the 18 months of the participatory study, rather I have focussed on actionable issues I deem relevant and important to progress in KNH.

I will first use component parts of the system to explain the whole (section 8.2). In my approach to providing a more general understanding of why things worked or did not work I found it useful to structure my ideas around the theme of professionalism. The importance of the roles and behaviour of professionals emerged as a theme that was common across the different specific forms of qualitative enquiry. In addition, KNH is run by medical professionals who, therefore, shape the organizational structure and context. Thus, I attempt to explore the uptake of best-practices using the concept of professionalism, defined as the observable behaviour of the different professionals I worked alongside, and to give an insight of institutional pressures that appeared to shape professionalism (section 8.3).

8.2 Using components parts to explain the whole

In this section, I will illustrate the limitation of considering the performance of the indicators at the micro-level, analogous to using parts, in explaining what influences performance. I draw on social cognitive theory and on diffusion of innovation theory (section 2.2.1), the latter being widely used in implementation research and is one of the theories considered in the development of the Ministry of Health clinical practice guidelines (CPGs) used in this PhD project.

8.2.1 Complexity of the tasks

There were 33 individual tasks assessed. I had recognized the interrelatedness of the tasks, therefore I defined composite indicators composed of multiple, individual tasks. For example, composite indicators in the domain assessment could comprise 1 - 5 tasks.

Contrary to my expectation, the composite indicator for severe malnutrition, comprising only two individual tasks which I considered to be simple, had poorer performance than the diarrhoea and pneumonia composite indicators which spanned five tasks each. This appears to defy the simple premise that the more steps in a pathway the less likely there is to be success. Similarly, where I might have expected equal success, for example the effect size of correctness of prescription for rehydration therapy, crystalline penicillin and feeds for the malnourished child, I observed differing effects. I attribute these unpredictable results to the influence of multiple, interacting factors a few of which are now depicted for illustration in the subsequent subsections.

8.2.2 Compatibility

The paediatrician trainees valued the practices that appeared to confer the status of a paediatrician in the context of KNH. Signs such as visible severe wasting and oedema (for malnutrition), being too 'simple', are perceived to conflict with this value and belief. This was clearly stated during the development of the quality indicators, making anthropometric measures the preferred modality of assessment of patients' nutritional status in KNH. It appears therefore, that the reliance of ETAT+ on these simple physical signs was at odds with the desire for new, perhaps more intellectual techniques of assessing malnutrition. The result was that more attention was paid to tasks perceived to be based on advanced knowledge (conferring status) than simple tasks.

Similarly, trainee paediatricians often failed to document key clinical signs or use them in classifying severity of illness as recommended in the CPG algorithms and instead classified severity of the illness 'intuitively'. Thus, a 'professional' assessment or classification relied on experience and perceived expertise and not an algorithm. This is compatible with the idea that clinicians place a strong value on their ability to perform from memory, a culture instilled in them perhaps by medical schools. Accordingly, reliance on memory was perceived to confer the status of a knowledgeable and autonomous doctor.

In comparison, dosage guidelines were already an accepted norm and this could explain why the uptake of best-practice for drug dosages was rapid. KNH had produced dosage guidelines for many years and clinicians had pre-existing self-efficacy on their use. Thus, the change of prescription practices was less demanding, more or less mechanical, required less skills and effort to improve and, was consistent with a norm to prescribe accurately. However, accurate intravenous fluid prescription, which demands more complex age-dependent fluid volume and flow rate calculations, was less well adopted. The additional problem here seemed to be the additional complexity of the guidelines themselves.

8.2.3 Perceived benefits of documentation

The performance of the indicators also reflected the extent to which the care given was actually documented. Among the four domains of care studied, the prescription of treatment perhaps has the most obvious, direct influence on patients' outcome. Assessment, classification and the follow-up care as defined in this study are on the causal pathway to correct specification of therapies but their documentation may not necessarily be correlated with perceptions around patients' outcome. Inadequate

assessment or incorrect classification of patients' illness thus did not seem to be perceived as compromising care so long as treatment was correctly prescribed.

8.2.4 Self-efficacy

Trainee paediatricians: The paediatrician trainees are a self-selected group aiming to improve their knowledge on how best to manage sick children and pass their qualifying examinations. They were eager to practise in an evidenced-based way that acknowledged and took account of current medical research and understanding, as could be implied by their attendance and self-motivation to organize continuous medical education (CMEs) (section 5.31.). Their self-efficacy beliefs in some aspects of care were bolstered by the CMEs (which some of them gave). As illustrated above, this made them good candidates as 'adopters' of new practices felt to bolster their status, or in line with their norms, as prospective paediatricians. I attribute the success in adoption of the CPGs achieved in the PhD thesis largely to the trainees' self-efficacy and capabilities.

Nurses: The nurses appeared to have a low sense of self-efficacy demonstrated by giving up on initiatives in the face of difficulties, although arguably the changes required of nurses demanded greater efforts. For example the nurses' committees formed in February 2009 and again in June 2009 to improve regular review of patients' progress and administration of treatment stopped functioning shortly after they were formed. The fact that quality indicators related to nursing care did not show improvement in the audit and feedback could also have made them lose faith in their capabilities. Rather than looking for solutions, the nurses tended to dwell on their coping deficiencies and viewed aspects of their environment, and thus their behaviour as immutable.

Consultants: Traditionally, teaching medical students has followed what may be described as a paternalistic model in which the passage of knowledge and skills from the academics

to the students occurs during the ward rounds. ETAT+ however challenged this concept. In fact, the trainee paediatricians became the teachers of the other trainees, undergraduates and even some of the senior academics who trained in ETAT+ later. This undermined the academics' and KNH consultants' self-efficacy as opinion leaders, particularly those not trained in ETAT+, potentially reducing advocacy for the adoption of ETAT+ related best-practices.

8.2.5 Innovation negativism

At the institutional and professional level, previous failures in implementation of quality initiatives undermined group-efficacy beliefs producing innovation negativism, particularly amongst staff who had worked in KNH for long periods. Nurses and most of the consultants, who had been in KNH for several years, had seen projects being initiated though rarely sustained. The paediatrician trainees had short cycles of three months rotating through each of the paediatric units and the entire postgraduate programme was three to four years. The trainees therefore may not have developed this negativism during their relatively short stay especially as the process of socialization was weak in KNH.

I have illustrated above how multiple factors may influence the health worker's (agent's) behaviour and manifest in different levels of implementation success for different ETAT+ recommendations. It would clearly be possible to try and define even more specific factors, characterising all the component parts of the 'machine' that produces care even more finely. Instead I now try and use my data and insights to provide what I feel to be a more useful understanding at a higher level of abstraction of how KNH has come to

produce the implementation uptake patterns observed, framing my thinking around the idea of professionalism.

8.3 Professionalism

Medical professionalism signifies a set of values, behaviours and relationships that underpin the trust the public has in health professionals (Tallis 2006). Advances in scientific technology, changing consumer expectations and increasing demand on resources have necessitated changes in the definition of medical professionalism. It is a term whose definition therefore varies across historical time periods and across cultural and social contexts.

Kenya's medical profession can be compared with the functional model which dominated sociological discussion in high-income countries from the 1930s to the 1960s and that was based on the self-declared duties of the profession. The model interpreted that the professionals' practices were based on formal knowledge, that the professionals demanded autonomy in their decision-making and that they adopted norms espousing a service orientation. Thus, provider expertise was understood to be employed to serve the best interests of the client (Scott 2008). As time went on however, many believed that the functional model confined itself to concerns with the interests and obligations of physicians rather than the moral responsibility to protect or serve patients. By the early 1970s, this model was beginning to be replaced by biomedical ethics that focused mostly on consideration of patients' interests and the process of shared decision-making.

Such thinking, and rejection of this more paternalistic philosophy, has subsequently seriously eroded the idea that society should cede moral and technical authority to a trusted and professional elite (Pellegrino 2008). Consequently, professional values have

been revised to meet twenty-first century expectations. Some values, such as mastery, autonomy, privilege and self-regulation, included in previous definitions have been dropped. Professional values remaining include embracing excellence in knowledge and clinical skills, the need to employ judgement and to display integrity and commitment to continue improvement in one's practice. More recent perhaps are notions of partnership between patient and doctor, based on mutual respect, altruism, individual responsibility and appropriate accountability (Tallis 2006). These values form the basis of a moral contract between the medical profession and society. I found that exploring the implementation of ETAT+ through the lens of professionalism, as discussed above, helped me make sense of the social interactions observed and the complexity of the organisation into which ETAT+ recommendations were being introduced.

The quantitative research in this PhD thesis mainly evaluated the uptake of ETAT+ recommendations by the trainee paediatricians. Therefore, in the following section I refer mostly to doctors' and in fact predominantly the consultants' behaviour. This is because the ultimate responsibilities, legally and morally, usually rest with the consultants, although the intention is not to belittle the contribution of other health professionals. This focus is also likely to reflect my own position as a consultant. By exploring professionalism, I acknowledge that it is an approach to the practice of medicine that is expressed in observable behaviour (Lesser, Lucey et al. 2010). I admit that there are many aspects to professionalism that help explain the success of implementation in a complex setting, however, I focus on six aspects for the purpose of this thesis: i) knowledge and clinical skills, ii) professional role models, iii) professional integrity, iv) commitment to continued improvement, v) working in teams and, vi) partnership with patients.

8.3.1 Knowledge and clinical skills

In high-income countries, there is a call for the professions to keep knowledge and skills updated. The same case should apply to professions in low-income countries. However, the challenge of accessing knowledge in a low-income country like Kenya is unlike that described in a high-income country (the UK) where Fraser and Greenhalgh commented 10 years ago that 'these days there is so much knowledge available that we risk drowning in it' (Fraser and Greenhalgh 2001) (pg 800). Thus, the problem is not felt to be access to knowledge but the overwhelming content. Within KNH and UoN accessibility of knowledge is, however, a problem. In general, professionals lack a culture of self-reading directed at improving practice and the training curriculum rarely encourages students to seek new information on patients' care (Gituma, Masika et al. 2009). Accordingly in Kenya, as reported elsewhere, problems in professionals' behaviour are linked to problems in medical knowledge (English, Esamai et al. 2004). In this PhD thesis I focus on basic knowledge and skills.

Fulfilling a need for evidence-based practice: Clinicians are believed to be sensitive to threats of loss of clinical autonomy by using guidelines (Broom, Adams et al. 2009). However the clinicians in KNH were happy with the guidelines, a finding consistent with Sheaff *et al's* work in the UK (Sheaff, Rogers et al. 2003). In fact, the academics wanted guidelines for other medical conditions developed, despite the fact that they did not sufficiently reinforce use of CPGs in this study. I attribute this paradox support for guidelines but failure to reinforce them, to the fact that such guidelines represented a 'short-cut' to the need to be knowledgeable and to teaching EBM. As a result, important professional values were on the face of it achieved – to be supportive of evidence-based guidelines was to be doing the right thing - this contributed to the acceptance of the CPGs in principle.

Perceived simplicity: However, the management of serious common illnesses was perceived as simple and not given due attention by senior professionals despite high mortality observed in KNH and emerging technologies in this field that has reduced their mortality. The low priority accorded to common illnesses was obvious during grand-rounds and until recently, in paediatrics examinations. I attribute this to a tendency to equate knowledge with rarity and awareness of the 'fine print' of medical diagnosis and management as well as the adoption of undergraduate and postgraduate curricula from western countries with adaption largely based on resources rather than on local disease burden. The assumption made is that knowledge of 'simple' diseases does not define a paediatrician; rather doctors should have mastered management of such diseases in their basic training. Nevertheless, with no one to teach such mastery the capabilities of the undergraduates are limited. This has the potential of shaping the practices and capabilities of the trainee paediatricians and consultant paediatricians.

Rituals that substitute for knowledge and skills: Some tasks were performed mechanically without critical reflection on the purpose or value of the task. Nurses recorded patients' vital signs, though erratically and often erroneously. Apparently these records were neither used by the nurses nor trusted by the doctors. Insufficient understanding on how to interpret of the vital signs further reduced the perceived benefits of this task. Thus, while performing this ritual was the 'badge' of a profession, its lack of value or meaning was as much a barrier to successfully improving patient monitoring as other barriers to change.

Similarly, for clinicians the traditional mortality meeting that preceded efforts to introduce structured clinical audits had become a ritual; an exercise that was required of professionals and KNH but one that had lost purpose and value.

Knowledge management: Professionals are described as being knowledgeable, and knowledge management therefore consists, in part, managing professionals' interactions. Hence Bots and Hans argue that the manager should be focused on bringing professionals in contact with one another so that knowledge sharing and creation emerge (Bots and Hans de 2002). Such knowledge management was not considered a priority in KNH. Here the baseline conditions were characterised by limited information on service delivery quality (linked to limited modern information technology tools), rigid inter-professional boundaries and a low value attached to socialization processes that could facilitate knowledge transfer. Although the approach to intervention aimed to address these hurdles through assessment and multi-professional feedback, little real headway was made with little sign that any of the professional groups felt real responsibility for sustaining any approach to advancing care through knowledge management.

8.3.2 Professional role models

Consultants' everyday behaviour, including demonstrating expertise, the practice of ethics and commitment, is the living demonstration of professionalism. They should become role models in their interpersonal interactions with patients, students and colleagues, in the way they recognize limits in their own practice and use clinical audit for self-reflection, to improve their practices and seek constructive criticism (Stark, Roberts et al. 2006). Patient reviews by consultants with junior staff provided opportunities for observing the diverse real-life narratives and small-group discussions that encompass many conventional aspects of such professionalism. This experiential learning provides opportunities for thoughtful reflection, clarification of professional practice and has the potential to bridge the theory and practice gap (Stark, Roberts et al. 2006). The benefits of these interactions were, however, not exploited optimally because competing priorities limited consultants' time to participate in such informal curricular activities.

In contrast, exposure to negative role models increases the likelihood of trainees becoming cynical and adopting negative professional values. As a consequence, inadequate consultants' commitment to ward-rounds and poor attendance at audit and feedback meetings (section 5.3.2) negatively influenced experiential learning. The limited tacit knowledge acquired by the trainee paediatricians and the junior staff also contributed to their unwillingness to do better or to change. Within KNH there was thus little consideration given to the differences and applicability of different mechanisms of sharing both knowledge and values (Bots and Hans de 2002; Nutley, Walter et al. 2008). In general it was assumed that formal, didactic sessions or meetings were preferred mode of knowledge transfer since they were less demanding on time.

8.3.3 Professional integrity

It appeared that many positive facets of professionalism were abandoned while people were inside KNH. This seemed context specific as many were expressed in contexts outside the institution within private practices or where consultants were engaged in research or leadership of national health care projects. In these latter contexts, the consultants appeared to be loyal to professional goals and compliant with professional values, while the structure of KNH reduced agents' desire/ability to act professionally. A similar double standard was seen amongst other staff including trainee paediatricians and nurses. Such contrasts suggest that the contextual influence of KNH is very powerful and indicate that interventions targeting change in behaviour of individuals are likely to have limited success in the absence of major organisational change.

8.3.4 Commitment to continued improvement

Though ETAT+ and my participatory intervention research tried to resurrect aspects of professionalism, in some areas this proved difficult.

Normative commitment: Inadequate normative commitment of the long serving staff, who provided interpersonal support and role modelling, might have had a negative impact by enhancing resilience of the pre-existing KNH norms and values. Professionals did not provide sufficient order-generating rules (standards) to assist in operationalizing of the best-practice recommendations and in promoting change as a priority. Such standards would include documentation policies and patient management standards such as admission and discharge criteria, as well as criteria for assessment, diagnosis, treatment and patients' follow-up care in the KNH context. In the absence of explicit order-generating rules, it appeared that the introduction of CPGs did not promote real accountability of the professionals for the quality of care delivered.

Leadership among the consultants: The decision to implement ETAT+ was authoritatively made by both institutions, KNH and UoN. Quality targets were collectively set in a consensus method. Professionals were involved in making both decisions and these should have prompted commitment to such goals. However, implementing best-practice recommendations was ultimately optional and individualistic and few KNH consultants or academics made obvious, active attempts to influence this. The consultant group, who might be expected to lead, did not adequately appear motivated by a professional responsibility to transform service delivery from the inside. This was despite the professionals having the necessary autonomy to exercise legitimate control over the conduct of their work and change working conditions.

8.3.5 Working in teams

Clinical care is a team effort. Pellegrino argues that each health professional, even when acting in a team, bears moral accountability for her or his action. Similarly, when acting as

a team member, each professional shares collective responsibility for the group actions (Pellegrino 2008).

Teamwork within disciplines: Quantitative data showed poor 'follow-up care' even during the post-intervention period. Follow-up care is an aggregate of tasks performed by several interdependent care providers in the first 48 hours of admission. For effective review of patients' progress after admission on the ward, knowledge of the clinical state of the patient during previous reviews is required. Poor 'follow-up' care suggests that clinicians did not recognise the interconnectedness of these tasks, or if recognised, they did not consider it important to provide co-workers with information needed to allow meaningful assessment of patients' progress. Thus, on admission the signs documented were those perceived to be just adequate to allow one to make a diagnosis, fulfilling the needs of the primary clinician, but inadequate to allow the patient's progress to be adequately assessed by subsequent clinicians. I attributed this to the underrated value of intra-professional relationships in patient management. This was likely aggravated by the fact that forums to discuss work processes were rare.

Inter-professional boundaries: The educational experience of professionals such as clinicians, nurses and nutritionists is radically different in each profession. In KNH professional boundaries exist that inhibit the transformation of knowledge across professional boundaries and thus, paradoxically, the diversity of professional backgrounds does not manifest itself as strength. The relative professionalism of an organization can be evaluated by the degree to which professionals are a part of the dominant coalitions or key groups that must be consulted for important organizational decisions (Anderson and McDaniel 2000). Inadequate engagement of experienced professionals, particularly the academics, as partners in organisational decision-making adversely affected their identification with KNH and their motivation to engage in activities to improve care in KNH.

Multi-disciplinary care is also poorly developed in KNH. If poor care is observed it was the norm of neither the nurses nor doctors to question. For example, there was limited evidence that crystalline penicillin for treatment of pneumonia, intravenous fluid for severe dehydration, or feeds for the malnourished children were given to patients as prescribed. This problem, while widely known to all professionals and highlighted during audit feedback meetings continued to be seen by clinicians as a 'nursing problem' and not of their concern. Professional boundaries were not only between clinicians and nurses. For example, it was not clear whether it was the nurses', nutritionists' or clinicians' responsibility to take height and calculate the Z-score (for diagnosis of malnutrition) or oversee monitoring of feed intake. This left the health workers uncertain of their responsibilities and resulted in insignificant change in performance of the related indicators. Nevertheless, seeking joint solutions to these problems was not sufficiently addressed, with problems perceived to be the responsibility of 'other professions', this in turn undermined perceived efficacy of staff to improve care even in their own 'territory'.

Hierarchical relationship: The relationship of the consultants with other staff in the hospital is a barrier to organisational learning processes that might promote better care.

The junior staff may perceive doctors as knowing everything and a failure to know everything, as being incompetent. Doctors therefore may feel obliged to appear as if they know everything rather than drawing on the knowledge of the team or making reference to credible sources of information such as clinical guidelines. Understandably therefore, in the KNH context, it was rare for senior staff to seek solutions by consulting junior staff or cadres with lower status because this also appeared to undermine the knowledge of senior physicians. This reflects the current, pre-eminent value placed on cognitive ability attached to the status of a doctor which, in the context of this thesis, can be seen as a barrier to promoting a learning environment.

8.3.6 Partnership with patients

Medicine exists in a social context; it is shaped by social forces and is practiced in a social milieu with implications that are social as well as individual (Pellegrino 2008). While Pellegrino agrees with this fact, he denies that this entails social construction as the method for defining the ends or goals of medicine. He argues that what things are, depends on our common perception of them rather than on anything intrinsic to them as ontological entities, medicine therefore becomes what a particular society allows it to be (Pellegrino 2008).

Social construction allows no permanent or stable ethics of professionalism. Some have argued that the moral obligation of doctors is not closed from insights, literature, history, or social or physical science (Pellegrino 2008). This suggests that in this era of interconnectedness and advanced information technology, the moral obligation of the doctor should not only have a local perspective but also a global perspective. In Pellegrino's view, it is a doctor's obligation to enhance, empower and enrich the patients' (or their surrogates) capacity to participate in their care (Pellegrino 2008). This suggests that the patient is dependent on the doctor's disclosure of diagnosis, treatment options and side effects, and prognosis. The health professionals therefore hold patients' right to participate in their care in trust.

This appears not to be the case in KNH where the old tradition of medical paternalism still seems to prevail. Often the role of the patient was to give the history of illness while the doctor decided what was best for the patient. In reality there was little effort made by the professions to share information with patients about, or to increase their understanding of their illness situations while they were in the hospital. To this effect the caretakers neither knew the severity of illness, treatment prescribed nor frequency of treatment administration. Consequently, the clinicians as well as other health professions

maintained primacy in the care of patients and protected their expert professional role. From the perspective of this thesis, this power imbalance makes patients vulnerable; because they are not given the opportunity to question any decisions in care such as not being given the prescribed treatment or their progress not being reviewed regularly by nurses or the doctors. I argue that the process of sharing information with patients could have given health professionals the opportunity to reflect on their practices and some of the errors observed in care could have been obviated.

These characteristics reflecting behaviour inconsistent with ideal professional norms were observed repeatedly across cadres. Such 'regularities' may arise as a result of similar combinations of forces and are a feature of chaotic systems. In this context forces that influence behaviour might include, amongst others, lack of clear goals, lack of minimum standards, lack of information and accountability, isolation of the professional groups and belief in immutability of the system.

I have used professionalism as a way to examine uptake of ETAT+ recommendations in KNH. In the next section, I will describe a few institutional pressures that shaped professionalism.

8.4 Institutional pressures

There are other important issues that are related to the complex situation the professionals found themselves in that determined their goal of ETAT+ training and their ability to adapt and further shaped the organization norms and values.

8.4.1 Primary goals, motivation and outcome expectations

Goals and motivation to embrace ETAT+ training appeared to be determined by the complexity of social contexts. The meaning, value and perceived outcome expectations

linked to ETAT+ for the management and staff groupings often differed, as observed from my perspective as a researcher. Therefore, while the ultimate goal of ETAT+ is improving patient's care, arguably an important professional value, engagement or participation in ETAT+ related activities also met other goals of interest to specific groups.

Trainee paediatricians had positive outcome expectations from engagement with ETAT+ as assessment of their ward work, with ETAT+ perceived to provide a new standard, contributed towards their qualifying examinations. For nurses, their primary motivation to undergo ETAT+ training often seemed related to improvement of their curriculum vitae. Among the nurses, ETAT+ also conferred some prestige as the same course was taught to consultants and the trainee paediatricians. However, unlike the paediatrician trainees, the nurses did not have positive outcome expectancy in implementing ETAT+ recommendations since provision of care consistent with the best-practice recommendations was not explicitly part of their performance appraisal.

To add to the complexity of the issue were varied institutional (KNH and UoN) goals for adopting ETAT+. The KNH management, by endorsing and providing ETAT+ training for their staff, aimed to comply with the hospital's directive to improve health workers' performance through continuous professional development (CPD). Having complied with the KNH directive the training was considered as the end in itself. There was no cue for knowledge translation.

UoN's goal in incorporating ETAT+ into the curriculum was to improve the quality of the undergraduate and postgraduate paediatric programmes by teaching evidence-based paediatrics. The new knowledge created a need that providing the course solved by including it as a taught subject within the legitimate curriculum. The uptake of ETAT+ was assessed by examination and was not based on routine patient care, which did not show

continued improvement after the immediate impact of the trainings. Revelation of this mismatch during audit and feedback and concerns from stakeholders that doctors from UoN were not well prepared to practise, while it created dissatisfaction among the academics, did not trigger obvious action.

8.4.2 Mal-adaptation

I have discussed above how the ideals of professionalism, that are still relied on to promote quality patient care, are often not met. Here I argue that part of the root-cause explanation is perhaps distinctly associated with the professional roles expected in the context of KNH. The current stated vision of KNH (Box 3.1), to provide specialized health services, as an organisation reflects the rhetoric of a politically driven statement whose formulation is ambitious but not based on the reality of KNH within its actual social context (section 6.1.3).

As a teaching hospital: The vision of KNH is to provide specialized health services within a centre of (specialist) excellence, however two issues complicate the achievement of this vision. First, as a teaching hospital there is a need to expose the students to a wide spectrum of medical conditions ranging from those that are common to those that are rare. Secondly, it is practically very difficult to adhere to this vision as this presumes adequate alternative care elsewhere and a functioning referral system yet there are few affordable inpatient health facilities to provide care to seriously ill children. In fact KNH with 240 beds has more than half of all beds available in government facilities serving Nairobi Province with a population of over 3 million. Unfortunately the strategic plan that determines the hospital's structure, staff recruitment and resource allocation policies reflects the aspirations of KNH and not this reality.

As a result, there seems to be a mismatch between the skills and interests of senior KNH staff and the tasks they are faced with. Drawing on Pareto's principle, more than 80% of the consultants in KNH are best suited to treat only 20% of the children admitted there. As a tertiary referral health facility, subspecialisation is preferred amongst KNH and academic staff, excellence in management of common illnesses or more generally skills in management of service delivery are not a priority. Exacerbating this situation, the subspecialists faced with poor resources and congested wards full of children with common illnesses, often feel unable to perform in a subspecialist role and, feeling let down, and may ultimately reject the more general role confronting them.

8.5 Conclusion

The findings of this thesis suggest that although KNH as an organisation retains a structure reliant on the ideals of professionalism amongst its key cadres, doctors, nurses and allied health professionals, there are clear gaps between the values encompassed in the ideal of professionalism and the observed actions of professionals in KNH. These spanned areas including knowledge management, expertise and skills, teamwork, conscientiousness and patient-centeredness. This situation has arisen as a result of the complex, adaptive processes at play within KNH as a system with dominant forces that are largely unsupportive of the enactment of such ideals.

Chapter 9

Discussion, Recommendations and Conclusion

Introduction

This PhD thesis aimed to evaluate the uptake of ETAT+ recommendations and to identify the factors that influenced the uptake of these recommendations in KNH, using a mixed methods approach. This research was motivated by the observation that there was a demand for ETAT+ training in KNH, which is a tertiary level facility and a university teaching hospital, despite the fact that ETAT+ was originally developed for use in district hospitals.

In addition to ETAT+ training and clinical practice guidelines (CPGs), the study introduced, through participatory action research (PAR), strategies such as educational sessions, audit and feedback and improvement of the infrastructure to support uptake of ETAT+ recommendations. Indicators of care were developed and used, quantitatively, to assess health-workers' performance. The PAR included 18 months of ethnographic study utilising participant observation supplemented by conversations and documents review. PAR allowed the hidden values, norms and interests to be studied and helped me to explore why the uptake of best-practice recommendations in KNH did not follow a simple linear model. PAR recognized that 'one size does not fit all' and that ETAT+ is a complex intervention that needed to be applied sympathetically to KNH's context requiring an understanding of the beliefs and attitudes of the participatory staff, as well as the cultural context. PAR not only revealed the complexity (the hurdles disrupting implementation), but also helped the researcher and the researched to find ways to action change. This study utilised mixed methods research approach with integration of quantitative and qualitative research at the methodological level and at the point of interpretation of the results.

9.1 Strengths and limitations

Mixed methods research allowed this PhD thesis to address positivism and interpretivism epistemological stances. This approach combined the strengths of both qualitative and quantitative methods and offset some limitations of each paradigm. For quantitative work, meaningful and realistic indicators were developed that could be captured consistently from case-record review of large numbers of cases. In this study setting where it was not possible to have a control 'hospital' the combined approach was particularly valuable. It provided the ability to offer robust inferences and a deep understanding of how and why effects emerged and to offer additional insights that would not have been gained from an epidemiological design.

The social science approaches helped to facilitate a clear understanding of the range of professionals' behaviour in KNH, by revealing the rules governing both the individual and organizational behaviours that might not have been as obvious if I had used a purely quantitative perspective. The long-term (18 months) ethnographic approach allowed me to go beyond what people say they do to see what they actually do (observed behaviour). Because of my prior interaction with the study context (more than 22 years), it was possible for me to relate the uptake of these quality initiatives with antecedent conditions and to recognize the role history can play, through an approach supplemented by archival data on the history of the KNH and University of Nairobi Medical School (UoN) as linked institutions.

Another unique quality of this thesis is my background. Being a legitimate member of KNH and UoN, a collaborator in the development of the CPGs and the ETAT+ course, a participant observer with a medical background and a researcher in action research in my own hospital, it is likely that my own interpretation of this study is very different to an

outsider researcher visiting the KNH hospital for the first time. I will argue that my background was an advantage because, while I admit I had to re-think many of the assumptions I held about the implementation of ETAT+, my long-term immersion in the field provided me with a broader contextualisation of the situations the staff faced, and thus a greater opportunity to elicit their perspectives and experiences of the ETAT+ implementation.

By virtue of the PAR approach, this study was able to include information from all hospital staff encountered; which meant there was no bias in selecting only the staff willing to participate. Natural inquiry meant that any staff stood a chance of being observed while additional theoretical and snowballing sampling approaches allowed in-depth exploration of emerging issues. Furthermore, targeting care of three diseases from the point of admission to at least the first 48hrs of admission gave the study considerable scope, including an ability to look for evidence of whether treatment was given (or not) as prescribed.

The study had a number of limitations. I acknowledge that a before and after design without control makes it difficult to establish causal-relationship between the intervention and the outcomes. However, to help strengthen the quantitative component of this PhD thesis I used indicators relevant to the entire study period and collected data representing five years (2005-2009) that allowed temporal trends to be examined increasing plausibility when attempting to interpret results. Furthermore, the use of mixed methods has allowed me to interrogate the quantitative findings that arise from a unique context. Secondly, as a researcher carrying out participant observation in my hospital and among my colleagues, I observed situations that would not be easily accessible to another researcher. As a colleague and member of the profession under observation I acknowledge that I have vested interests and have brought to this work a

long history of experience and ideas that may have influenced my interpretation of events. As a researcher with prior relationships with the researched, I felt this influenced their expectations as well as my own and either party may have taken some important issues for granted. For example, I observed the hospital management felt there was no need to delegate the task to facilitate the implementation process to their staff because they considered me as one of them rather than a researcher. The power relationships, given my prior role and my status as consultant and as an academic, may also have influenced the participants and the management's actions. However, as I have stated above, I believe my participant observer status was an advantage in this study because many of the changes I oversaw, or wish to pursue in the future, would not have been possible were it not for the positions I hold in the KNH and the UoN.

A third potential limitation of the study arises out of the fact that the data collected and interpretation of this thesis may have been influenced by my desire to see the interventions succeed. In part, this is driven by a wish for personal effectiveness and a desire to improve service delivery in KNH, both providing a personal sense of purpose. My personal mental model may also have made me focus on specific variables or behaviours of interest. However, Wolkott argues that the ability to see a potential solution to a problem provides an evaluator with an effective way to observe people at work by focusing on something rather than everything (Wolcott 1994). This does not however exclude the possibility that I could have missed potentially important facilitators of and barriers to the implementation process. As I have inferred above, it is quite likely that another observer with different interests would produce a different world view. For example, a social scientist or an epidemiologist may use different theoretical approaches that postulate different underlying mechanisms of participants' behaviour, yet I do not believe this invalidates my findings.

Despite these limitations, I believe that the knowledge gained from this study is important in illuminating the opportunities and threats and highlighting areas that need to be considered in planning implementation of quality improvement initiatives in KNH, an important Kenyan institution, and perhaps other facilities in similar circumstances.

9.2 Overview and discussion of key findings

While considering the results of this study one must take the context into consideration. A lot of literature available on adoption of guidelines is from high-income countries whose contextual factors are different from those of low-income countries. For example, in high-income settings there has been an erosion of trust in professionals as guarantors of high standards of conduct and competence with concerns expressed in the media and the political arena (Rowe and Calnan 2006; Marshall, Heath et al. 2010). This has prompted debate about the accountability of clinicians, challenged professionals' autonomy and led to a search for mechanisms to hold institutions and professionals accountable. In addition, there has been a shift towards engaging patients as partners in decision-making with moves to have their preferences considered (Rowe and Calnan 2006; Pellegrino 2008).

This PhD thesis has revealed a different context. Thus, within KNH the practitioners, particularly the consultants, exhibit paternalistic characteristics and believe themselves to be trusted. In addition, there are neither robust professionals' nor managerial accountability processes and the patients are not involved in decision-making. With this in mind, I now give an overview and discussion of the key results for this PhD thesis.

9.2.1 Adequacy of intervention and participatory action research

In chapter 5, I have illustrated the adequacy of ETAT+ training and extent to which strategies to improve uptake of ETAT+ recommendations were implemented in KNH. In brief, by the end of 2008, all the front-line clinicians (trainee paediatricians and clinical officers), about three quarters of the consultants and about half of all the nurses in the paediatric general wards and paediatric emergency unit (PEU) had received 5-day ETAT+ training. Strategies to improve uptake of ETAT+ recommendations included building staff capacity to conduct routine clinical audits, identify problems in implementation of best-practices, propose and implement feasible solutions. Quality indicators developed by KNH staff using a consensus method were used as standards against which the uptake of ETAT+ recommendations was assessed. These quality indicators are largely consistent with inpatient paediatric quality of care indicators developed recently for low-income countries using a Delphi technique (Ntoburi, Hutchings et al. 2010).

Despite attempting several approaches, introduction of routine clinical audit by staff other than myself was largely unsuccessful. Challenges in implementation of ETAT+ recommendations included lack of some basic skills and inability to prioritize care of the seriously sick child. Efforts to implement agreed solutions did not follow an orderly sequence suggested by linear models of implementation of quality initiatives, rather processes were evolutionary and context dependent. For example, I thought I would enhance teamwork by inter-professional learning. However, it was difficult to introduce inter-professional educational sessions as educational needs varied, timetables were incompatible and there was no history of such joint learning. Further, though it was my desire to have the staff actively engaged in the participatory action research (PAR), both staff and management preferred to be engaged mainly through attending meetings and planning for actions. Active implementation was largely left to few interested individuals,

particularly the trainee paediatricians and those professionals who chose a leadership role. In a large organisation such as KNH, this resulted in a disjointed and *ad hoc* implementation processes. This could be partly explained by contextual factors including the constraints imposed by the socially created structure and the power relationships at play. Of significance is that the behavioural change model (ETAT+) that I intended to implement, though compatible with social cognitive theory, might not have been in all of my colleague's interests as described by Hayward and Lukes in the debate around the third dimension power (Hayward and Lukes 2008).

In this thesis, staff found the quality initiatives for capacity building to be an 'eye opener' giving an impression that they enabled people to improve care by building their confidence and motivation. This study suggests that quality initiatives related to building capacity such as educational programmes (such as ETAT+ and educational sessions), quality assessment (audit and rapid hospital assessment), problem analysis (problem-solving meeting and action planning) and reorganization of work processes should not be treated as end products. Rather they are parts of a process, whose real meaning emerges as the process is completed. Reporting success of *parts* risks losing sight of the whole; whole in this study being actual provision of quality care throughout an admission. For example, in this PhD thesis capacity building quality initiatives were regarded by the agents as an end in themselves not as a means to achieve an end. Related to this, Nutley *et al* argue that knowledge should not be treated as a tangible thing, rather as an object that cannot be separated from the use of that object (Nutley, Walter et al. 2008).

9.2.2 Factors influencing uptake of ETAT+ recommendations

Chapter 6 depicts an analysis at four system levels. These are not necessarily specified in real life but organising my findings against this framework helped me understand the

system and the interactions of its parts. In reality, ETAT+ training was widely accepted as advantageous in KNH and UoN. Some convergence of interests and agendas promoted ownership and mobilization of resources by the hospital management and the UoN to support training. In addition, within KNH leadership emerged that helped build organizational capacity to support uptake of the best-practices. This leadership was consistent with charismatic leadership or of a champion of change (Conger and Kanungo 1987; Strange and Mumford 2002). He looked for opportunities to improve organizational processes and recognized what staff needed to implement ETAT+ recommendations. He overcame hospital management inertia and made it possible for staff to be trained in ETAT+ while working to improve the hospital infra-structure. He was also a catalyst for the emergence of leadership in more constrained areas that helped create an environment to support uptake of ETAT+ recommendations. Nevertheless, knowledge translation into action was not smooth and encountered several problems related to the practices and competency of the individual (or groups of) health professionals and hospital management. Though professional autonomy was not constrained, professionals demonstrated insufficient capacity to self-organization at the micro and clinical level.

Most knowledge on barriers of and facilitators to implementation of best-practices are not derived from prospective studies, but from theoretical reflection, self reports or from observational studies. These studies have limitations of self-perception and personal insight. The few prospective studies focus on work flow process (Nugus and Braithwaite 2010; Cruz, Perry et al. 2011) rather than on factors affecting health-workers clinical decision-making. Cabana *et al* in their review of 76 studies on barriers to guideline adherence used the 'Professional perception model' and identified the following factors: lack of awareness, lack of familiarity, lack of agreement, lack of self-efficacy and perceived external barriers beyond the control of individuals (Cabana, S et al. 1999). In

these studies lack of awareness and familiarity were in reference to the guidelines, however, in the KNH context, lack of awareness and familiarity reflected limited know-how to perform the task to lead to guideline adherence. In low-income countries, health services research has documented doctors' and nurses' limited knowledge as the problem impeding the implementation of guidelines (Karaolis, Jackson et al. 2007).

Similarly, in the KNH context lack of agreement was in relation to previous experiences, with tendencies to being conservative and complacent, rather than to belief based on alternative evidence or professional judgment, reflecting a lack of learning culture in KNH. Lack of self-efficacy has been attributed to lack of knowledge. In this PhD thesis, there was a low sense of self-efficacy among nurses and consultants with regard to change, and simple knowledge transfer did not have an appreciable effect on this sense of fatalism. Attitudinal and contextual factors have been described elsewhere as causes of failure of guideline implementation (Hayes, Murray et al. 2010). Cabana suggests that in order for adoption to occur, there must be expectation of improvement (Cabana, S et al. 1999). A culture receptive to change increases the success of adoption of interventions (Cruz, Perry et al. 2011). Innovation negativism in KNH and, in nursing in particular, lack of role models nurses may explain the failure of uptake of the best-practices.

In the KNH context, lack of role clarification was identified as a barrier to implementation of best-practices. This resonates with other guideline implementation studies for conditions that required multi-disciplinary care (Hayes, Murray et al. 2010). Though this PhD thesis was carried out in a tertiary hospital, there are similarities with influences on implementation of ETAT+ recommendations observed in district hospitals. Nzinga *et al* identified avoidance of conflict, hierarchical power structures and expectation of the staff to be supervised, poor communication and teamwork and failure of management to provide guidance as barriers to ETAT+ implementation in Kenyan district hospitals

(Nzinga, Mbidyo et al. 2009). In the same study, ambiguous terms used for classification of pneumonia and high staff turnover were also cited as problems. The latter however was not a problem in KNH.

The level of analysis in this chapter assumes that behaviour change follows simple linear dynamics; thus lack of performance is due to problems at the operational level. Further assumption is that solving the service-specific problems will result in the desired performance. Though this level of analysis does not lead to root cause problems identification (see below), it is nevertheless essential in understanding the component parts of the *whole* problem.

9.2.3 Adherence to best-practice recommendations

Chapter 7 gives the results of the before and after study design tracking practice changes. The indicators in the domains ‘assessment’, ‘classification’ and ‘treatment’ were adapted from the CPGs for common, important diseases in KNH and reflect individual clinicians’ actions. The indicators in the domain ‘follow-up’ were emphasized during the ETAT+ training but were not listed in the CPGs. The ‘follow-up’ indicators required team-work and collective efficacy. Generally, before the intervention, care was largely inconsistent with best-practice recommendations. Out of 17 key indicators only three had base line performance of over 50% (crystalline penicillin dose, classification for severe malnutrition and classification for dehydration), while 9 of them had performance of below 10%. This poor care is consistent with the findings in district hospitals in this country (English, Esamai et al. 2004), earlier studies within KNH (Maina 2007; Nzioki, Irimu et al. 2009) and other studies in low-income countries (Nolan, Angos et al. 2001; Osterholt, Onikpo et al. 2009).

The intervention had an absolute effect size of over 20% in eight of the 17 key indicators, with three of them having an effect size of over 50% (pneumonia classification, gentamicin dosage and prescription for feeds of the malnourished). In total, for six of the 17 indicators a performance of over 70% was achieved in the post-intervention period, with only one indicator (classification of dehydration) achieving performance of over 90%. For all indicators that reflected admitting clinicians' practices, either a very large or large absolute effect size ($\geq +50\%$ and $\geq +20\%$ respectively) or good baseline performance ($\geq 70\%$) was observed except for assessment of malnutrition. However, all the key quality indicators in the follow-up domain achieved performance of less than 10% in the post-intervention period. Examining the trends for changes of the key indicators in six monthly periods from 2005-2009 showed that the adoption of best practices displayed no consistent pattern with the effect of training and the PAR component being unpredictable. Studies elsewhere suggest that the effect of educational programs are more effective in contexts of low baseline adherence with guidelines (Ferrer, Artigas et al. 2008). This was not a consistent finding in this PhD, though the baseline adherence to guidelines was low, suggesting that other factors also affected the implementation process.

Most interventions to improve case management in low-income countries have been conducted in out-patient settings involving care of patients mainly by nurses before and after IMCI (or related) training. There are methodological differences that make comparison of the outpatient IMCI studies with this PhD thesis difficult.

9.2.4 Explaining the whole not just the component

In Chapter 8, I draw meaning from the results of the two research paradigms used in these data, additional literature, and my background and experiences to make sense of

the observed uptake of ETAT+ recommendations. This chapter illustrates the difficulty of using component parts to interpret the whole. This approach tended to give useful but perhaps superficial results that did not take into account the complexity of KNH. Thus, ETAT+ training was used as a means to achieve variable personal and institutional goals that did not necessarily result in actual improvement of care. While the acquired trainee paediatricians' knowledge generated a clamour for change enhanced by self-efficacy and perceived benefits, this was not the case with other professionals whose value commitment was preservation of the *status quo*.

In attempting to provide an overarching understanding, I found the ideas encompassed by the concept of professionalism useful. There were clear gaps between the stated values espoused in the ideal of professionalism and the observed actions of professionals in KNH. Gaps spanned knowledge management, expertise and skills, teamwork, conscientiousness and patient centeredness. While these may be construed as professional misconduct, I argue that these gaps are consequences of an adaptive response to the historical context represented by KNH and UoN, and indeed Kenya. There are specific tensions between the rhetoric of the KNH vision and the reality confronting senior staff. As part of their vision KNH and UoN place a high value on medical sub-specialization, however, in actual practice the overwhelming needs are for management of general illnesses. A rather paternalistic relationship between the consultants and the other staff including the trainee paediatricians exists, which potentially inhibits innovation and also compromises the institutional ability to learn. A consequence is the preservation of 'rituals', such as recording of patients vital signs and conducting mortality meetings that represent good practice rather than an acceptance that training and practice must adapt to the challenges of poor resources and understaffing. One effect of this, seen from even the undergraduate foundation, is potentially far reaching with

production of doctors, specialists and subspecialists who themselves are drilled in behaviours that are not responsive to societal needs. Such staff, in turn, train other health workers and the cycle continues, thus producing a systemic phenomenon in which the ideal of professionals as protectors of the public and patients' interests is undermined.

Though ETAT+ focussed on knowledge transfer, the knowledge was translated into action to the extent it met peoples' self interests. This equivocality in meaning and goals of ETAT+ training resonates well with subjective interpretation of science by agents in other studies (Ferlie, Fitzgerald et al. 2005). In the same vein, the Plan-Do-Study-Act (PDSA) cycle has been used successfully in implementation of quality initiatives (McNulty and Ferlie 2004; Krinsky, Mroz et al. 2007), but in this PhD thesis it was difficult to complete the cycle because of lack of a learning culture and lack of accountability mechanisms in a complex system. Failure to complete the PDSA cycle has been documented in other participatory action research, where the implementation process has been described as messy and unpredictable (Ferlie, Fitzgerald et al. 2005).

The successes achieved in this thesis are attributed to self-efficacy of the trainee paediatricians. However, there was insufficient reinforcement of their evidence-based decision-making process by the consultants. I attribute this to failure of clinical leadership among the senior professionals. Other research has cited organizational culture and leadership from top management as key factors that influence success of quality initiatives (Nzinga, Mbidyo et al. 2009; Kaplan, Brady et al. 2010). While this is also true in KNH, KNH was a professional led organization and professional autonomy was not constrained.

In brief, I feel that professional roles and identity emerged as the single most important determinant for the uptake of best-practice recommendations. This contradicts Michie *et*

al's findings that 'social/professional role and identity' and 'motivation and goals' are unlikely to constitute difficulties in implementation of mental health guidelines (Michie, Johnson et al. 2005; Michie, Pilling et al. 2007). In Michie *et al's* study only 20% of the sampled population of health workers were willing to participate. This had the potential of introducing bias in the responses. In addition, use of structured interviews in their study may have failed to explore aspects of *inner professionalism* as explained below (section 9.4). I attribute these differences in the findings to the differences in research methods and contexts.

There is dearth of information on mixed methods research in hospital-based health research that has integrated the results of the different research paradigms to obtain meta-inference (O'Cathain, Murphy et al. 2007; Lewin, Glenton et al. 2009) or in line with the gestalt principles, which underpin the importance of the idea of 'the whole being greater than the sum of the parts' (Teddlie and Tashakkori 2003). Lack of resources and poor access to relevant expertise have been cited as reasons why qualitative methods are not used extensively alongside quantitative research; where the two research paradigms have been used there is little evidence of explicit integration of the data (Benning, Ghaleb et al. 2011; Lewin, Glenton et al. 2009).

9.3 Implication of theory applied in designing the study

The PRECEDE-PROCEED (P-P) framework provided a useful starting point for this PhD thesis. It provided a simple framework for understanding the predisposing, enabling and reinforcing factors that operate at multiple levels of a health system to facilitate or hinder uptake of best-practice recommendations.

Using principles of P-P, the study directed initial attention to the outcomes; defined as achievement of performance of quality indicators agreed upon by KNH staff. We (participants and myself) used the clinical audit to measure outcomes and conducted educational sessions to address the gaps of care revealed by the audits. A focus on measurable outcome measures had inherent problems. First, in this PhD thesis the action research took the form of experiential learning, a process in which understanding was derived from and continuously modified by experience, informing approaches to deal with situations as they arose. This form of learning is in contrast to traditional forms of learning with which I was more familiar, where knowledge is accumulated as a storehouse of facts. In the latter model, it is possible to measure how much one has learned by the amount of fixed ideas the person has accumulated (Kolb 1984) and such a paradigm suggests that interpretation of intervention effectiveness can then be based on analysis of accumulated facts or their direct translation into actions or clinical outcomes in the future.

Experiential learning on the other hand recognises that multiple social processes including changes in attitude, communication, motivation, and creative problem-solving act in real-time to continuously affect decision-making and outcomes (Kolb 1984). This model implies that the link between knowledge and action is far more complex and also indicates that there are many more potential consequences of intervention, many of which may be valuable, that may not be captured in direct outcome assessments. For example, while the behavioural outcomes captured in the audit did not always show useful improvement, the process itself provided justification for the staff and management's continued involvement in the action research and helped identify priority areas in capacity building. Similarly, nurses and trainee paediatricians showed great zeal in some respects for uptake of the ETAT+ recommendations after audit feedback and

CMEs indicating perhaps significant changes in attitudes even though in reality these interventions did not appear to trigger change in practices as would have been expected in a system governed by more linear dynamics. These deeper insights gained from PAR suggest that there were sustained, strong attractors to the old practices that were yet to be addressed by the intervention approach and underscore the complexity of organizational change.

In this PhD thesis, PAR turned out to be a process of sense-making and learning rather than following a pre-designed process guided by a plan or framework such as PRECEDE-PROCEED. Learning took place continuously as the world unfolded and I had to act in order to learn. To add to the complexity was the fact that due to the participatory nature of the study the staff decided what was actually to be done and how it was to be done. In so doing their actions (consonant with prevailing norms) shaped my actions, adding complexity to the power relationship. The PRECEDE-PROCEED model, my *a priori* mental models and the anticipated use of PDSA cycles as a tool to fix system problems were thus found to be limiting.

As a result of this work I learned therefore that in a complex system, intervention and facilitation should pay attention to the following facts: i) learning to inform change is a continuous process that necessitates changing original plans and situated adaptation as the world unfolds, therefore one should be ready for surprises; ii) action research should be evaluated by assessing human adaptive measures as well as or rather than relying on behavioural outcomes alone. Thus, I should have recognized efforts in PAR focused on making KNH a learning organization, perhaps instead of prioritizing measurable achievements, I should have, in addition, judged success on the basis of my qualitative understanding of performance (Kolb 1984; Nutley, Walter et al. 2008). Despite these shortcomings the P-P model provided a normative model to examine how and why

uptake of best practices diverged from linear dynamics and that challenged the correlation between knowledge transfer and knowledge translation.

9.4 Significance and contribution

Methodology : Although Sobo argues that it is impossible to conduct an ethnographic study in health services research (Sobo 2009) this PhD thesis illustrates otherwise. It is possible to observe the action of individual health professionals at the time they are giving care to distressed patients within the context of care. These encounters are important because they are the final pathways through which guidelines and ETAT+ recommendations ultimately affect the lives of the sick person. However, to understand the contents of such interactions one needs to have content knowledge and expertise in the phenomena under study while experience in carrying out qualitative research is required to understand the social and interpersonal relationships observed. To the best of my knowledge, this is the first time an extensive ethnographic study (18 months) involving study of health worker-patient clinical encounters has been reported from such a low-income setting.

Professionalism: There is a dearth of research on the influence of professionalism on the uptake of quality initiatives. When considering professionalism the outer observable behaviour of the professionals can be assessed by non-medical observers; this, I argue is what can be acquired through formal and codified knowledge. On the other hand is what I regard as the *inner professionalism* that can be acquired through non-formal, un-codified and tacit knowledge (Levay and Waks 2009). Aspects of *inner professionalism* are probably opaque to non-medical researchers. The professionals maintain such a situation in order to safe guard their freedom of discretion. This PhD thesis teased out the nuances

of *inner professionalism* of the consultants (as a group norm) such as the skill-practice mismatch that negatively influenced absorptive capacity for new knowledge and inhibited expression of a learning organizational culture (Greenhalgh, Roberts et al. 2004). This thesis also uncovered deficiencies in procedural knowledge that undermine translation of knowledge into action. I attribute these deficiencies to poor professional development in medical schools.

Attribution error: Poor hospital care in low-income countries has been attributed to lack of resources. I argue that such a statement needs to be qualified. While poor care for acute complicated diseases and chronic diseases could be attributed to lack of resources, poor care for common acute childhood illnesses is also due to poor planning, lack of awareness and poor self-regulation among the professionals together with, in some contexts, simply inadequate levels of human resources. For example, in this PhD thesis lack of awareness of the specifications of required equipment or personnel or lack of skills resulted in inappropriate investments and inefficiency. Solutions to poor care may therefore need to be more nuanced than simply calling for additional resources.

In the following sections, I discuss the implications for medical education, hospital leadership and partners in promoting the KNH's ability to adapt. My epistemological stance in explicating the findings of this PhD thesis is informed by the knowledge gained in the process of conducting and writing this PhD thesis, my background knowledge and literature review. Some of the issues that need to be addressed are deeply ingrained in the values and beliefs about medical professionalism and I acknowledge the likelihood that my recommendations are also rooted in my own, personal values and how these may have evolved. Any change is challenging as it requires people to leave behind their long standing world-views and comfortable ways of doing things. First to abandon behaviors and belief systems that were felt to work well in the past and made us

successful as the country's leading national and teaching hospital and secondly because of fear of our ability to master new ways of doing things (Souba and McFadden 2009). In addition, acknowledging that the primacy of patients' welfare, and autonomy and social justice have not necessarily been well served by professionals is likely to be difficult for those within KNH.

9.5 Implications for medical education

Medical professionalism has for a long time been presumed to be a *calling* supported by attitudinal competency and based on innate characteristics or an altruistic personal philosophy. There is increasing evidence, however, that professionalism cannot be assumed; it is acquired and thus must be taught (Cruess, Cruess et al. 2009). In the context of UoN, KNH and the wider Kenyan health system where considerable reliance is still placed on professionalism, the starting point for its development should be the undergraduate medical curriculum, subsequently reinforced by postgraduate programmes and continuous professional development. Cruess *et al* suggest concepts to be included such as: altruism and the notion of calling, knowledge of the code of ethics, understanding the nature and limitations of individual and collective autonomy and making explicit links between professional status and societal obligations (Cruess, Cruess et al. 2009). Medical education thus needs to enhance professional capabilities; competency alone is inadequate to make a good doctor who helps to create a good health system. Fraser and Greenhalgh define capability as the extent to which individuals can adapt to change, generate new knowledge and continue to improve their performance (Fraser and Greenhalgh 2001). Thus, Lucey and Souba argue that the goal of medical education is to develop physicians who remain professional despite stressors and competing personal and professional priorities (Lucey and Souba 2010). I acknowledge

that there are many issues that need to be addressed in medical education but for this thesis I focus on immediately relevant methods of teaching professionalism to undergraduates.

Teaching methods: Teaching methods used in the UoN medical school should enhance creativity and the imaginative dimension of professional capability rather than relying on planned, formal events with tightly defined, content-orientated learning objectives (an approach replicated in my own intervention during CME sessions). Ward-rounds provide chances for this because cases are presented in their real-world context (Fraser and Greenhalgh 2001). In particular, ward-rounds can enhance the imaginative dimension of professional capability and help in the development of problem-solving capabilities that contribute to abilities in analytic thinking in complex decision-making processes (Bandura 1989). Within KNH, this dimension of teaching has been undermined over the years by having too many students and too little consultants' time. However, problem-based learning does not by itself improve knowledge content as assessed in written examinations, thus both content learning and non-linear learning methods are required (Fraser and Greenhalgh 2001).

Teaching methods used in the medical school should reinforce the culture of team work rather than promote values based on individual decision-making as a collectivistic culture is needed to improve performance in group-oriented activities. Developing team approaches may particularly help people perform if their psychological orientation is congruent with the structure of the social systems in which they work (Bandura 2001).

Emphasize ethics and professionalism: Building professional ethos and identity should be a key role of the medical education with implications for the curriculum design and content. This should include teaching leadership skills (see below), communication skills

and nurturing ethical sensitivity by adopting a life-long regular practice of reflective learning. The students should be familiar with ethical codes (Campbell and Chin 2011) and the local ethical guidelines that are set by the respective regulatory bodies. Nevertheless, these guidelines should be revised to make them relevant to emerging technologies and effective for self-regulation. Trainees should also be encouraged to reflect on professional values. Unfortunately, at present there is very limited effort in this area. The current system for mentorship should be strengthened, and mentors enabled, so that the students learn from positive role models and within supportive work conditions.

Leadership skills: Leadership skills that need to be learned include: leading and motivating teams, networking and appreciating the contributions of others, conflict management, communication and negotiation skills and, planning and organizing meetings. It follows then, that doctors in training and trainee paediatricians should be acquainted with quality of care diagnostic and analytic skills such as techniques of quality assessment. These might include developing goals and minimum standards, using clinical audit and feedback as a means to promote reflection, team learning and, using data to understand quality of care and seeking the root causes of problems. Emphasis should be on the common aspects of care; processes that affect the majority of patients rather than creating an impression that effective solution to health care must be complex or reliant on advanced technology. In addition, students should be encouraged to be curious rather than dogmatic, to be inquisitive rather than judgmental, to be empowering rather than patronizing and to be approachable rather than presenting as someone who 'knows it all' (Souba 2010).

9.6 Implication for hospital leadership

This PhD thesis illustrates that adaptation of KNH as an organization to changes as a result of introduction of quality initiatives was a challenge. It appeared that on one hand, KNH managers believed they were dealing with learned colleagues who should have regulated themselves and given the best medical care. On the other hand, the paediatricians, as well as other professionals, expected KNH managers to supervise and direct them, roles that challenge the professionals' capability. Given this tension, KNH leadership should understand the characteristics of complex adaptive systems and in so doing enhance a learning culture and KNH adaptation by: i) focussing on relationship building and strategies of sense-making that allow members to construct a shared way of interpreting complex activities and provide the staff with identity and cohesion (Nutley, Walter et al. 2008), ii) recognizing that complex systems have emergent properties that can be stifled by rigid structures, thus there should be a search for improvisational behaviour that enables innovation and creativity at all levels , iii) nurturing system thinking – to see the systemic whole and to understand how members' interactions trigger a network of events and, vi) recognizing that work in professional organizations is unusually complex, uncertain and of great social importance while at the same time understanding that the allegiance of professionals is most likely to their own profession and its societal values rather than to the vision and values of KNH (Anderson and McDaniel 2000).

Given the long history of KNH and UoN, the hospital leadership should reflect on how KNH has evolved to be what it is today, review the existing structures and policies, consider their relevance to the current times and identify where mal-adaptation has occurred. The goal here is to re-affirm KNH's motto 'Quality Health Care' and to uphold professional values from the top-level management to the front-line service providers. I

propose the following strategies as a framework for giving direction (assuming KNH retains its dual role of a national referral and university teaching hospital).

Vision alignment: Drawing from Strange and Mumford's argument of how a vision influences followers' actions, I argue that a vision that is merely rhetoric (which appears to be the case with the current KNH vision) fails to: articulate the uniqueness of the organization, provide the basis for the leader to motivate followers or provide a sense of identity, provide people with a framework for coordination and integration of their activities and finally may fail to provide a foundation for organizational norms and structures (Strange and Mumford 2002). A vision that fails to provide meaning to the leader and the followers cannot give direction.

Related to this, KNH needs to establish a workforce that is commensurable with the local morbidity and mortality patterns of users in order to promote appropriate organizational responsiveness to societal needs. This implies having more consultants whose focus is general paediatrics and probably running general and specialized paediatrics wards separately but not independently.

In addition, KNH should redefine its status as a tertiary referral facility. KNH has a budget set aside for corporate activities and currently it is used for outreach services to individuals in the community. As a national hospital and teaching hospital, KNH should take a leadership role in mentoring the referring health facilities. By so doing, KNH will render a valued service and enhance capabilities of the health workers in these facilities. Besides, KNH should give feedback to the referring health workers and enable them to provide follow-up care. This may improve care in these referring facilities and ultimately reduce the workload in KNH.

Support emergence of leadership from within: Bringing professionals on board in implementation of quality initiatives is pivotal so that they become role models demonstrating the benefits of an initiative to colleagues (Ferlie, Fitzgerald et al. 2005). This PhD thesis demonstrates how professionals can often see interventions as management projects. While respected professionals with a level of charisma and who lead by example can emerge from such a context, as demonstrated in this PhD thesis, such an event is essentially left to chance. The management should signal that implementation of best-practices is a priority and promote adoption of such roles, recognising such roles in a merit-based system, and act more widely to legitimize the process.

Promote positive professional relationships: Leadership should realize that medicine is teamwork and ensure that followers have common shared goals. To enhance teamwork, members should understand the scope and limits of the responsibilities of the team members as agreed upon at the operational level. The diversity of the professionals within the KNH should be seen as strength. Common learning should be strengthened through inter-professional education, particularly when opportunities arise for informal learning. Ward rounds and audit feedback sessions should facilitate a collective sense-making, provide opportunity for socialization, and allow all relevant care providers to contribute to the care of patients and feel their contribution is valued. This may create a culture where learning is continuous and valued.

Inculcating a culture of quality care: KNH leadership should promote accountability by facilitating professionals to define what practices constitutes quality care and subsequently foster development of goals and standards of patients' care at all levels. These standards should guide the Audit Committee and the Medical Advisory Committee

in their tasks. The professionals should be facilitated to develop control measures that are embedded in the routine work-flow processes and that promote adherence to standards.

Improving efficiency: Modern information technology (IT) is limited in KNH. Health information systems need to be designed to meet the needs of KNH and to provide data that can be used to inform quality improvement decisions. This will provide data on performance to raise awareness and promote new ways of thinking and embed the values of a learning organization. Strengthening the IT systems will also improve efficiency by providing rapid access to information at the point of care, provide better decision-making support, with the potential for reducing medical errors, and redesign hospital work-flow. Meanwhile, professionals should improve their record keeping and ensure all medical notes are authenticated to improve accountability.

Decentralizing power and control: In a complex system, devolution of power enhances adaptability and self-organization (Anderson and McDaniel 2000; Burnes 2005). In addition, critical analysis of power relationships in centralized administrative systems suggests the irresponsibility and apathy observed among staff in such a system can be addressed by promoting a wider diffusion of power and responsibility through democratization of institutional activities (Willmott 2005). This can bring professionals and managers into working relationship that promotes improved service provision. Further, team leaders should be identified based on their capabilities. This is in contrast to just considering the portfolio of what one has learned; a strategy that creates a situation in which senior staff are retained in *powerful positions* regardless of their capability and efficiency.

9.7 Implications for institutional collaboration

In the absence of a stand-alone academic medical centre, strategies should be developed to improve collaboration between KNH as a public, national referral hospital and teaching hospital. The partnership of KNH and the medical schools creates the social and cultural context in which medicine is practiced and so both share responsibility for tackling the challenges to medical professionalism and their health system consequences. While multiple stakeholders can be a source of strength, they may also complicate the development of solutions linked to the self-interests of parties, competing institutional priorities and societal pressures. This PhD thesis suggests that collaboration between KNH and its legitimate partners is one of the fundamental challenges that make the functions of KNH complex. Solutions must therefore embrace the complexity of the situation, posing an adaptive challenge that requires changes in the individual and collective values of all partners, and in shared mental models of what are good medical and organizational practices.

Collaboration is built on honest dialogue and bilateral access to information between the partners. In addition, to facilitate resource exchange and to clarify changing institutional priorities there should be regular dialogue between the partners. For collaboration to have optimal *whole-system* results, the partners must be willing to invest in the best interests of the *whole*. Souba and McFadden argue that tackling complex challenges in an organization is difficult, if not impossible, when part of the organization is immune to stated values, goals and guiding principles (Souba and McFadden 2009). They add that without exceptional leadership at the top, the immune group can bring even the more well-intended organization to a standstill.

Drawing on the findings of this PhD thesis, the first step in amending teamwork between UoN and KNH is to be aware of the conditions spelt out in the joint memorandum of understanding (MoU) with efforts to fulfil them or amend them accordingly. The two institutions should identify their shared goals as spelt out in the strategic plan for each institution. These goals should provide a sense of meaning and purpose to the collaboration that should be reflected in staff appraisal. For example, rather than basing the promotion of the academics primarily on publications, as is the case currently, the extent to which the person is (or not) involved in clinical teaching, clinical duties and service improvement should also be considered. To promote shared sense making the UoN should be represented in all KNH Appointment Committees and vice versa as stated in the MoU; a requisite that has not been honoured to date. As a tool to unify UoN and KNH staff and to regulate their practices, the Division of Paediatrics and the Medical Advisory Committees should be revived.

Drawing from Souba and McFadden's suggested approach, to enhance collaboration between KNH and UoN there would be value in KNH senior staff and senior academics taking part in a negotiation seminars, cheerleading workshops, or team building retreats (Souba and McFadden 2009). They caution that organizations can only do so much, change cannot be mandated or legislated and each individual must be committed to change. Individuals need to search themselves to discover how their mental models were shaped and how they came to be the person they are today. They must be willing to redesign themselves so that life will work better, personally and professionally. The authors conclude that "if you've designed yourself to be a snow blower it is impossible to mow the lawn" (Souba and McFadden 2009)(pg 4).

9.8 Future research

Further research linked to a conceptual models that examine factors that influence uptake of best-practices across all levels of the health care system is needed in low-income countries with, I suggest, a focus on professionalism to:

- a) Identify and develop standard approaches to evaluate professionalism.
- b) Determine health professionals' knowledge and attitudes on professional values.
- c) Identify effective methods of nurturing professionalism and clinical leadership, assessing the impact of professionalism on quality of care spanning structure, processes and patients' outcomes.
- d) Identify and assess impact of methods of improving multidisciplinary care, perhaps linked to approaches to decentralise power and understand power relationship among the care providers.
- e) Understanding the role of mentorship in clinical medicine and means to promote reflective practice
- f) Engage professionals in developing patient-centred services and fostering the voice of patients in system design.

This thesis has shown that it is not appropriate to assess the success of action research using just behavioural outcomes. More empirical work is required to develop standardized measures of evaluating the short and long-term impact of action research.

This thesis further illustrates that there is need to assess the adaptive capacity of a complex system to guide the implementation process of quality initiatives. Further work is needed to define measures to assess adaptive capacity of complex systems.

9.9 Conclusions

ETAT+ and the clinical practice guidelines were accepted in this tertiary care facility and also within University of Nairobi Medical School. The findings suggest that it is easy to influence the trainee paediatricians and their high sense of self-efficacy enabled them to use the guidelines in decision-making processes. Thus, the intervention produced large effects on some indicators, predominantly those that reflected individual trainee paediatricians' tasks. The role of the social science part of this PhD thesis is to provide some meaning behind staffs' beliefs and behaviour in the hope that a greater understanding of the KNH context (deconstruction of events) may help to overcome the barriers and facilitate change.

This study illustrates the challenges of introducing a set of new practices within a major public teaching institution. It also exposes major areas of care of the serious common illnesses such as patient assessment and administration of prescribed treatment that have been neglected. The study further suggests that the effort to implement best-practices clashes with current professional commitments and their tacit goals and may in fact be beyond the broad capability of the health workers (as distinct from their technical competence). This has implications on the quality of training for undergraduates and postgraduates in KNH and UoN medical school and leadership of the hospital and the medical school.

This PhD thesis illustrates that implementation of best-practices is a complex process that is largely unpredictable. This is attributed to the complexity of contextual factors. There is no simple solution to implementation of best-practices; rather the solutions are complex requiring system-wide approach that takes into account of the interrelatedness of the agents, functions and other components of the system.

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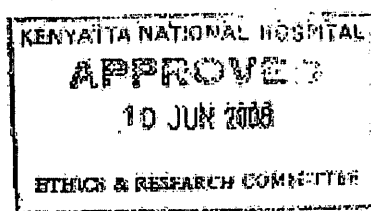
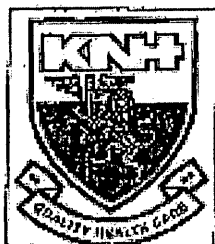
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Appendix 1: KNH Ethics and Research Committee Approval



KENYATTA NATIONAL HOSPITAL
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Ref: KNH-ERC/01/480

Dr. Grace Ithiu
Dept. of Paediatrics and Child Health
University of Nairobi

Dear Dr. Ithiu

MDO/K
Working for M.A.
for C.M.D.O
23/10/08

10th June, 2008

RESEARCH PROPOSAL: "IMPACT OF EMERGENCY CARE TRAINING ON THE QUALITY OF CARE OF THE SERIOUSLY SICK CHILD IN KENYATTA NATIONAL HOSPITAL"
(P0714/2008)

This is to inform you that the Kenyatta National Hospital Ethics and Research Committee has reviewed and approved your above revised research proposal for the period 10th June, 2008 – 9th June, 2009.

You will be required to request for a renewal of the approval if you intend to continue with the study beyond the deadline given. Clearance for export of biological specimen must also be obtained from KNH-ERC for each batch.

On behalf of the Committee, I wish you fruitful research and look forward to receiving a summary of the research findings upon completion of the study.

This information will form part of database that will be consulted in future when processing related research study so as to minimize chances of study duplication.

Yours sincerely

PROF. A. N. GUANTAI
SECRETARY, KNH-ERC

c.c. Prof. K.M. Bhatt, Chairperson, KNH-ERC

The Deputy Director CS, KNH

Co-Investigators:

Prof. Gilbert Kokwaro, Dept. of Clinical Pharmacology, UoN

Dr. Mike English, Centre for Demographic Medicine Research, KEMRI

Prof. D. Mton-Ngacha, Dept. of Clinical Pharmacology, UoN

Dr. C. Malwa, Division of Paediatrics, KNH

Dr. Harrison Kihara, Division of Paediatrics, KNH

Mr. Julius Mwangi, Centre for Demographic Medicine Research, KEMRI

Dr. Santanu Mjoro, Dept. of Paediatrics, University of Oxford, UK

Appendix 2a: Summary of quality of care indicators of patient's admitted with diagnosis of pneumonia, source of information and target population

| Domain | Quality of care indicator | Source of information | Target patients (on admission) |
|------------------------------------|--|--------------------------------------|---|
| Patient assessment | Proportion of patients with duration of cough documented | Clinician's ward admission notes | All |
| | Proportion of patients with presence or difficulty feeding documented | Clinician's ward admission notes | All patients who were alert |
| Initial clinical examination | Proportion of patients with respiratory rate documented. | Clinician's ward admission notes | All |
| | Proportion of patients with presence or absence of lower chest-wall indrawing documented. | Clinician's ward admission notes | All |
| | Proportion of patients with level of consciousness documented using standard scales (e.g. Glasgow, AVPU) | Clinician's ward admission notes | All |
| Investigations on day of admission | Proportion of patients with SpO ₂ (oxygen saturation by pulse oximeter or blood gas analysis) documented on admission | Clinician's ward/PEU admission notes | All |
| | Proportion of patients with blood glucose documented on admission | Clinician's ward/PEU admission notes | All patients who are unable to feed or had altered consciousness. |
| | Proportion of patients with HIV status determined within 48hours of admission and status documented | Clinician's ward/PEU admission notes | All |
| Classification | Proportion of patients whose classification of illness is consistent with the clinical practice guidelines (CPGs) | Clinician's ward admission notes | All |
| Treatment | Proportion of patients with antibiotics prescription (type and dose) consistent with CPGs ^{a,b} | Treatment chart | All |
| | Proportion of patient's with oxygen prescription consistent with CPGs | Treatment chart | All patient prescribed oxygen |
| Monitoring in the first 48 hrs | Proportion of patients with drugs given as prescribed by the clinician. | Treatment chart | All |
| | Proportion of patient's respiratory rate monitored every 6 hours. | Observation chart | Patient with very severe pneumonia |
| | Proportion of patients receiving IVF/NGF as prescribed by clinician | Feeding /fluid chart | Patient prescribed IVF/NGF |
| | Proportion of patients reviewed by clinician at least after 12 hours after admission. | Clinician's notes | Patient with very severe pneumonia |

^a Crystalline penicillin rounded to the nearest 50,000 IU per dose is appropriate

^b Gentamicin rounded to the nearest 5mg per dose is appropriate

Appendix 2 b: Summary of quality of care indicators of patient with admission diagnosis of severe dehydration/diarrhoea, source of information and target population.

| Domain | Quality of care indicator | Source of information | Target patients (on admission) |
|------------------------------------|---|--------------------------------------|--|
| Patient assessment | Proportion of patients with duration of diarrhoea documented | Clinician's ward admission notes | All |
| | Proportion of patient's with presence or absence of vomiting everything documented | Clinician's ward admission notes | All |
| | Proportion of patients with ability or difficulty feeding documented | Clinician's ward admission notes | All patients who are alert |
| Initial clinical examination | Proportion of patients with documentation of whether eyes are sunken or not | Clinician's ward admission notes | All |
| | Proportion of patients with documentation of the time it takes for pinched skin fold to return to normal. | Clinician's ward admission notes | All |
| | Proportion of patients with peripheral pulse character: normal/weak/unpalpable documented. | Clinician's ward admission notes | Patient's with altered consciousness. |
| | Proportion of patients with level of consciousness documented using standard scales (e.g. Glasgow, AVPU) | Clinician's ward admission notes | All |
| Investigations on day of admission | Proportion of patients with blood glucose documented on admission | Clinician's ward/PEU admission notes | All patients who are unable to feed or have altered consciousness. |
| Classification | Proportion of patients whose classification of illness is consistent with the CPGs. | Clinician's ward admission notes | All |
| Treatment | Proportion of patients of patients whose rehydration therapy (type of fluid and volume) is consistent with CPGs ^a | Treatment chart | All |
| Monitoring in the first 48 hrs | Proportion of patients with fluid given as prescribed by the clinician. | Fluid chart | All |
| | Proportion of patient's reassessed within 2 hours of completion of intravenous fluid (IV) therapy | Clinician's noted | Patient's duration of IV fluid indicated. |

^a Fluid volume rounded to the nearest 10mls per feed will be considered appropriate

Appendix 2c: Summary of quality of care indicators of patients admitted with diagnosis of severe malnutrition, source of information and target population

| Domain | Quality of care indicator | Source of information | Target patients (on admission) |
|------------------------------------|--|--------------------------------------|-------------------------------------|
| Patient assessment | Proportion of patient's with presence or absence of diarrhoea documented | Clinician's ward admission notes | All |
| | Proportion of patients with presence or absence of vomiting documented | Clinician's ward admission notes | All |
| Initial clinical examination | Proportion of patients with weight-for-height/length ratio or Z-score documented in the clinician's note. | Clinician's ward/PEU admission notes | All |
| | Proportion of patients with presence or absence of oedema or wasting determined and documented. | Clinician's ward admission notes | All |
| | Proportion of patients with level of consciousness documented using standard scales (e.g. Glasgow, AVPU) | Clinician's ward admission notes | All |
| | Proportion of patients with peripheral pulse character: normal/weak/unpalpable documented. | Clinician's admission notes | Patient's with altered |
| Investigations on day of admission | Proportion of patients with SpO ₂ (oxygen saturation by pulse oximeter or blood gas analysis) documented on admission | Clinician's ward/PEU admission notes | All |
| | Proportion of patients blood glucose documented on admission | Clinician's ward/PEU admission notes | All patients who are unable to feed |
| | Proportion of patients with HIV status determined within 48 hours of admission and status documented | Clinician's ward/PEU admission notes | All |
| Classification | Proportion of patients whose classification of illness is consistent with the clinical practice guidelines (CPGs) | Clinician's ward admission notes | All |
| Treatment | Proportion of patients of patients with (choice and dose) of antibiotics consistent with the CPGs ^{a,b} | Treatment chart | All |
| | Proportion of severely malnourished patient with feeds (type, volume and route) consistent with the CPGs | Treatment chart | All |
| | Proportion of patient's with prescription to 'keep warm' in the treatment sheet. | Treatment chart | All patients without fever. |
| Monitoring in the first 48 hrs | Proportion of patients with feeds given as prescribed by the clinician. | Treatment chart | All |
| | Proportion of patient's temperature monitored every 6 hours. | Observation chart | All |

^a Crystalline penicillin rounded to the nearest 50,000 IU per dose is appropriate

^b Gentamicin rounded to the nearest 5mg per dose is appropriate

Appendix 3: Sampling of medical records

Source of data/information: I start by explaining how I identified the medical records from which the quality of care was evaluated. Upon discharge from KNH all the inpatient medical records are archived in the KNH Medical Records Department. Vital information which includes inpatient number, age category (0-1months, 2-11months) for children aged less than 12 months but actual age in months for children aged over 12 months, sex, disease classification based on International Classification of Diseases 10th Edition (ICD-10), duration of ward stay, outcome (dead or alive) and month of discharge are coded, indexed and entered for all children in a computer database. From this database, I created a reduced dataset containing only data on children aged 2-59 months with a discharge diagnosis indicated by relevant ICD 10, 3 – character core classifications as shown in Appendix 3/Table 1. Children without a record of their age, or discharge diagnosis were not included in the database. Databases were prepared in this way for the total population of potentially eligible cases for all the years 2005 to 2009.

Appendix 3/ Table 1: ICD-10 classification of the target illnesses.

| | ICD 3 –character core classification |
|------------------------|---|
| Diarrhoea /dehydration | A08 Viral and other specified infections. A09 diarrhoea and gastroenteritis of presumed infectious origin E86 volume depletion K52 Other non-infectious gastroenteritis and colitis |
| Pneumonia | J13 Pneumonia due to <i>Streptococcus pneumoniae</i> J14 Pneumonia due to <i>Haemophilus influenza</i> J15 Bacterial pneumonia, not else classified J18 Pneumonia, organism unspecified. |
| Severe malnutrition | E40 Kwashiorkor E41 Nutritional marasmus E42 Marasmic Kwashiorkor E43 Unspecified severe protein-energy malnutrition. E46 Unspecified protein-energy malnutrition |

These data for children discharged with a tracer disease diagnosis were transferred from the database to STATA 11 and three discrete data tables prepared one for each disease tracer with sub-tables and for each calendar year. STATA- do files were then prepared for selecting patients from the diarrhoea, pneumonia and severe malnutrition specific lists taking into consideration the eligible age-groups for each condition.

Random selection of a sample of medical records: My aim was to sample 70 records for each quarter of each year for each of the three tracer diseases (total 280 per year). In order to obtain the desired sample size I first considered the likely proportion that would be deemed ineligible after meeting exclusion criteria. As the proportions meeting exclusion criteria and the total number of patients per quarter varied somewhat by quarter and by disease I opted to use a modified multistage random sampling technique to develop a hierarchy of random samples, of decreasing size, with the smaller samples

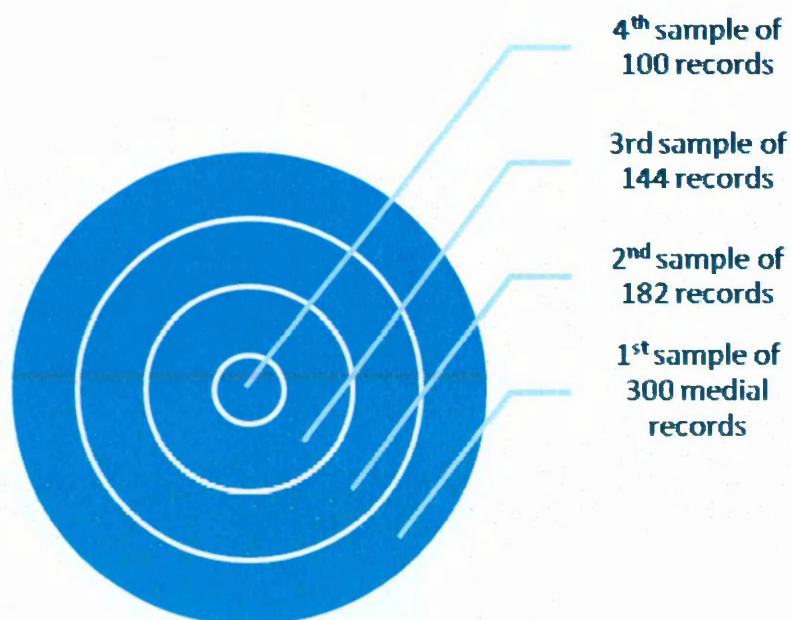
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nested sequentially within the bigger samples. For example, for pneumonia I generated a computer list of 300 randomly selected medical records (1st sample). From the 1st sample I generated a list of 182 records- (2nd sample) representing a 60% sample of the 1st, from the 2nd sample I randomly selected 80% (144) records to obtain the 3rd sample. Finally, I took a 70% random sample from the 3rd sample to yield the 4th sample which consisted of a list of 100 medical records. The medical records in this 4th sample were retrieved (identified by inpatient number); the data assistant and I manually perused them all and eliminated those meeting exclusion criteria. If this process yielded less than 70 eligible records we retrieved the additional 44 listed records that completed the 3rd sample population and again manually identified those that met the inclusion criteria. If this procedure still yielded fewer than the desired sample size of 70 eligible cases, we progressed to the 2nd sample population to identify a further 38 records remaining in this level of the hierarchy (2nd sample) for eligibility screening to ensure they met inclusion criteria and so on up to the 1st sample in the hierarchy until sufficient eligible records were identified (Appendix 3/Fig1).



Appendix 3/Fig1: Hierarchy of random samples

Identification of study population: Though the reference population was selected on the basis of a discharge diagnosis that was suggestive of one of the three tracer diseases, the selection of actual study population required that patient also have an admission diagnosis consistent with the terms defined for these reference. (Appendix 3 / Table 2). Additional inclusion criteria and exclusion criteria are now described.

Inclusion criteria: All diagnoses made by the clinician that logically implied the presence of the tracer diseases were included in this study as illustrated below.

Pneumonia cases: Records of children aged 2-59 months with a diagnosis of pneumonia on discharge and for whom any of the terms acceptable for pneumonia was also mentioned in the admission diagnosis (Appendix 3 / table 2).

Diarrhoea cases: Records of children aged 2-59 months with a diagnosis of diarrhoea/dehydration on discharge and for whom any of the terms acceptable for

diarrhoea was also mentioned in the admission diagnosis and who had intravenous fluids prescribed on admission (Appendix 3 / table 2).

Severe malnutrition cases: Records of children aged 6-59 months with a diagnosis of severe malnutrition on discharge and for whom any of the accepted terms for malnutrition was mentioned in the admission diagnosis. Also included were records of patients with an admission diagnosis of either failure to thrive, underweight, malnutrition or small for age if they had a prescription of F75, special milk or Resomal within the first 72 hours of admission (an indication that severe malnutrition was being treated even if the diagnosis was not explicitly made). These cases were however labelled as ‘missed diagnoses’ (Appendix 3 / table 2).

Appendix 3/ Table 2: Reference terms for the target diseases

| | Pneumonia | Diarrhoea | Severe malnutrition. |
|--|---|--|--|
| Terms accepted as reference terms for the target diseases. | Pneumonia Severe pneumonia Very severe pneumonia Bronchopneumonia B’ pneumonia Lobar pneumonia Acute lower respiratory infection (ALRI) | Diarrhoea Gastroenteritis Dehydration (only if diarrhoea/loose/watery stool is mentioned in the history) | Wasting Marasmus Marasmic – kwashiorkor Kwashiorkor Oedematous malnutrition Protein energy malnutrition (PEM) Severe malnutrition Failure to thrive (FTT) ^a Underweight ^a Malnutrition ^a Small for age ^a |

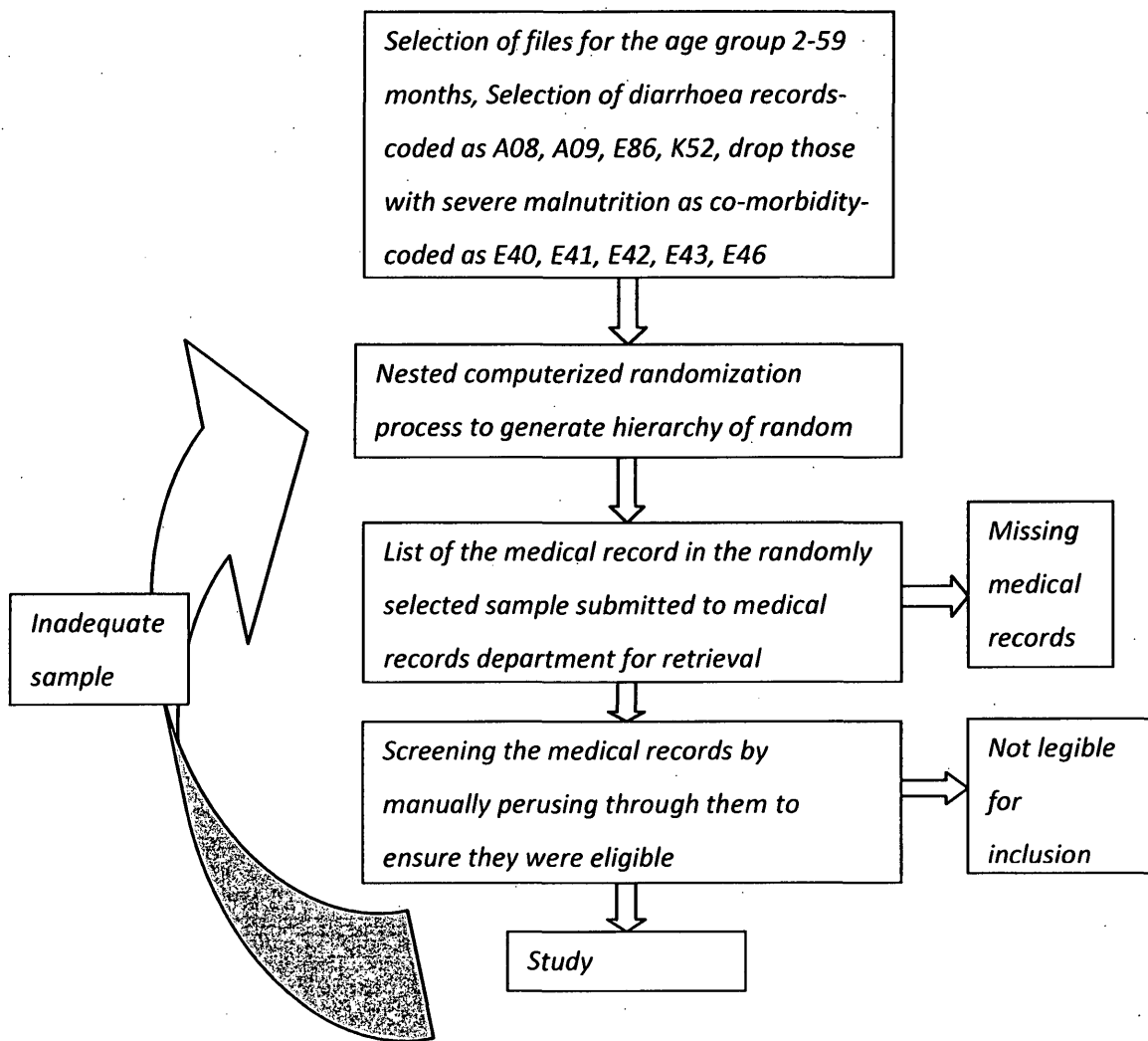
^{a-} inclusion in the study required that the patients were prescribed F75, special milk or Resomal within 72 hours of admission but considered as missed diagnosis.

Exclusion criteria: Patients with co-morbidity that rendered the CPGs inappropriate were excluded ((Appendix 3 / table 3).

Appendix 3/Table 3: Exclusion criteria of medical records of the target diseases

| Exclusion criteria for all medical records or specific to tracer disease | | | |
|--|--|---|---|
| All traces diseases | Pneumonia | Diarrhoea | Severe malnutrition |
| <p>Records of patients with chronic conditions namely malignancy, renal, heart or chronic lung diseases on admission.</p> <p>HIV infected children who are already on antiretroviral drugs and those undergoing nutritional rehabilitation and/or on anti TB treatment at the time of admission.</p> <p>Records of patients admitted due to herbal intoxication or other chemical poisoning.</p> | <p>All patients with a documented admission to KNH within one month preceding the admission.</p> <p>Children with a diagnosis of meningitis made within 48 hours of admission.</p> <p>Children with admission or discharge diagnosis of severe malnutrition</p> <p>Cough more than 14 days</p> <p>Patients who required nebulised bronchodilator on admission or diagnosed to have bronchial Asthma, bronchiolitis or broncho-spasms.</p> <p>Diagnosis of <i>Pneumocystis Carinii pneumonia</i> (PCP/ <i>Pneumocystis jirovecii pneumonia</i>(PJP))</p> <p>Pulmonary tuberculosis</p> | <p>All patients who had evidence of intravenous fluids therapy for more than 24 hours before being referred to KNH.</p> <p>Children with admission or discharge diagnosis of severe malnutrition</p> <p>Diarrhoea more than 14 days.</p> <p>Dysentery</p> <p>Bloody diarrhoea</p> | <p>Children with a diagnosis of meningitis made within 48 hours of admission.</p> |

To avoid introducing selection bias, only the single illness episode of pneumonia or diarrhoea was examined for the target disease and quarter of the year for which the medical records were randomly selected even if upon examining the record there was additional admissions or a co-morbid ‘tracer’ diagnosis of interest. Our data therefore represent random samples of episodes of illness treatment and it is possible that a child was randomly included in both the pneumonia and diarrhoea selections. A summary of the process of selection of medical records is given in Appendix 3 / fig 2.



Appendix 3/Fig 2: Flow chart for selection of the study population

Appendix 4a :Operational definitions of quality indicators in assessment of pneumonia and diarrhoea patients

| Quality indicators | Potential outcome | Operational definitions |
|---|-----------------------|--|
| Level of consciousness | Alert | Documented to be alert or, Glasgow coma scale =15 or patient who are able to drink |
| | Altered consciousness | Documented to be V, P, or U on AVPU coma scale or Glasgow coma scale less than 15 or lethargic |
| | No information | No mention of the level of conscious in AVPU or Glasgow coma scale. No mention of presence or absence of lethargy |
| Ability to drink | Able to drink | Documented to be able to drink from history or clinician testing for the sign |
| | Unable to drink | Documented not able to drink as tested by clinician or from the history. Altered consciousness or lethargy is used as proxy for inability to drink if ability to drink is not documented. |
| | No information | No mention of ability or inability to drink and no documentation that patient has altered consciousness (as defined above) |
| Pulse character | Pulse not weak | Pulse character documented as normal or palpable. It is assumed that a patient who is alert or is able to drink is unlikely to be in hypovolemic shock, thus documentation of alert or ability to drink is used as a proxy for 'pulse not weak'. |
| | Weak pulse | Patients whose pulse character was documented as weak or not palpable |
| | No information | No information on the pulse character |
| Cyanosis | No cyanosis | Documented to have no cyanosis or SPO ₂ above 90% or oxygen above 11Kp by blood gas analysis |
| | Cyanosis | Documented to have cyanosis |
| | No information | No mention of presence or absence of cyanosis and SPO ₂ not above 90%. Oxygen content not above 11kp by blood gas analysis |
| Lower chest wall indrawing | No indrawing | Documented not to have lower chest-wall indrawing. |
| | Indrawing present | Documented to have lower chest-wall indrawing |
| | No information | No mention of presence or absence of lower chest-wall indrawing |
| Respiratory rate | No Tachypnea | Respiratory rate of patients aged 2-11 months documented to be <50 per min while those patients aged 12-59months had respiratory rate documented as <40 per min |
| | Tachypnea | Respiratory rate of patient aged 2-11 months documented to be ≥50 per min while patient aged 12-59months had respiratory rate documented as ≥40 per min |
| | No information | No documented respiratory rate in clinicians' admission notes. |
| Sunken eyes | No sunken eyes | Eyes documented as normal or not sunken |
| | Sunken eyes | Eyes documented as sunken |
| | No information | No mention of presence or absence of sunken eyes |
| Skin turgor Skin fold goes back in seconds (sec) | immediately/ <1sec | Skin pinch documented to go back <1sec or immediately |
| | 1-2sec | Skin pinch documented to go back ≥1sec ≤2sec, skin pinch + |
| | >2sec | Skin pinch documented to go back >2sec, skin pinch ++ |
| | No information | Skin turgor documented simply as reduced or no mention skin turgor at all. |

Appendix 4b: Operational definitions of quality indicators in assessment of severe malnutrition

| Quality indicators | Potential outcome | Operational definitions |
|---|--------------------------------|---|
| Weight-for-height /length Z score/ratio | Severe malnutrition | Weight-for-height /length Z score < -3SD or Weight-for-height /length ratio <70% |
| | No severe malnutrition | Weight-for-height /length Z score ≥ -3SD or Weight-for-height /length ratio ≥70% |
| | No information | Patients whose Weight-for-height /length Z score/ratio is NOT recorded anywhere on the admission day |
| visible severe wasting | Visible severe wasting present | patient documented to have the sign visible severe wasting (or wasting +/++/+++) or emaciated |
| | No visible severe wasting | Patient documented as 'normal nutritional status' or not to have the sign severe visible wasting (as above) |
| | No information | No mention of the sign wasting or emaciated |
| oedema | Oedema | Documented to have the sign oedema |
| | No Oedema | Documented not to have oedema |
| | No information | No mention of presence or absence of oedema |

Appendix 5a: Documentation of key clinical signs for pneumonia patients

| Key signs | Possible outcome of assessment | 2005 | 2006 | 2007 | 2008 | 2009 |
|-------------------------------------|--------------------------------|------------|------------|-------------|-------------|-------------|
| | | N=265 | N=300 | N=259 | N=312 | N=293 |
| | | n (%) | n (%) | n (%) | n (%) | n (%) |
| Level of consciousness ^a | Alert | 37 (14.0%) | 55 (18.3%) | 124 (47.9%) | 219 (70.2%) | 203 (69.3%) |
| | Altered | 21(7.9%) | 27 (9.0%) | 15 (5.8%) | 11 (3.5%) | 15 (5.1%) |
| | No information | 207(78.1%) | 218(72.7%) | 120 (46.3%) | 82 (26.3%) | 75 (25.6%) |
| Ability to drink ^b | Able to drink | 24 (9.0%) | 20(6.67%) | 33(12.7%) | 63(20.2%) | 80(27.3%) |
| | Unable to drink | 76(28.7%) | 88(29.3%) | 77(29.7%) | 86(27.6%) | 75(25.6%) |
| | No information | 165(62.3%) | 192(64.0%) | 149(57.5%) | 163(52.2%) | 138(47.1%) |
| Cyanosis | Cyanosis | 2(1%) | 1 (0%) | 7 (2.7%) | 5 (1.6%) | 0/0% |
| | No cyanosis | 154(58.1%) | 196(65.3%) | 157(60.6%) | 224(71.8%) | 213(72.7%) |
| | No information | 109(41.1%) | 103(34.3%) | 95(36.7%) | 83 (26.6%) | 80(27.3%) |
| Lower chest wall indrawing | indrawing | 37 (14.0%) | 60 (20.0%) | 78(30.1%) | 156(50.0%) | 202(68.9%) |
| | No Indrawing | 12 (4.5%) | 18 (6.0%) | 29 (11.2%) | 69(22.1%) | 36 (12.3%) |
| | No information | 216(81.5%) | 222(74.0%) | 151(58.7%) | 86(27.9%) | 55 (18.8%) |
| Respiratory rate | No Tachypnea | 44 (16.6%) | 40 (13.3%) | 41 (15.8%) | 56(18.0%) | 42 (14.3%) |
| | Tachypnea | 162(61.1%) | 183(61.0%) | 169 (65.3%) | 208(66.7%) | 213(72.7%) |
| | No information | 59 (22.3%) | 77 (25.7%) | 49 (18.9%) | 48 (15.4%) | 38 (13.0%) |

^a Patients able to drink are assumed they are alert if level of consciousness is not documented.

^b Patients documented to have altered consciousness are assumed they are not able to drink if ability to drink is not documented

Appendix 5b: Documentation of key clinical characteristics for diarrhoea patients

| Key signs | Possible outcome of assessment | 2005 | 2006 | 2007 | 2008 | 2009 |
|-------------------------------------|--------------------------------|-------------|-------------|-------------|-------------|-------------|
| | | N=297 | N=308 | N=303 | N=334 | 294 |
| | | n (%) | n (%) | n (%) | n (%) | n (%) |
| Level of consciousness ^a | Alert | 27 (12.8%) | 45 (18.2%) | 112 (43.1%) | 171(57.8%) | 130(49.4%) |
| | Altered | 56 (26.5%) | 46 (18.6%) | 60(23.1%) | 74 (25.0%) | 86 (32.7%) |
| | No information | 128 (60.7%) | 157 (63.3%) | 88(33.9%) | 51(17.2%) | 47(17.9%) |
| Ability to drink ^b | Able to drink | 22 (7.4%) | 29 (9.4%) | 33 (10.9%) | 61(18.3%) | 33 (11.2%) |
| | Unable to drink | 66 (22.2%) | 71 (23.1%) | 83 (27.4%) | 84(25.2%) | 103(35.0%) |
| | No information | 209 (70.4%) | 208 (67.5%) | 187 (61.7%) | 189(56.6%) | 158(53.7%) |
| Pulse character | Weak | 2 (0.7%) | 3 (1.0%) | 5 (1.7%) | 4(1.2%) | 17 (5.8%) |
| | Normal | 72(24.2%) | 104 (33.8%) | 158 (52.2%) | 276(82.6%) | 233 (79.3%) |
| | No information | 223(75.1%) | 201 (65.3%) | 140 (46.2%) | 54(16.2%) | 44 (15.0%) |
| sunken eyes | Sunken eyes | 84 (28.3%) | 113 (36.7%) | 173(57.1%) | 201(60.2%) | 187(63.6%) |
| | Eyes not Sunken | 2(0.7%) | 8(2.6%) | 12(4.0%) | 37(11.1%) | 19(6.5%) |
| | No information | 211(71.0%) | 187(60.7%) | 118(38.9%) | 96(28.7%) | 88(29.9%) |
| Skin turgor Skin fold goes back | < 2sec | 18 (6.1%) | 23 (7.5%) | 85 (28.1%) | 189 (56.6%) | 154 (52.4%) |
| | ≥ 2sec | 1 (0.3%) | 2 (0.7%) | 25 (8.3%) | 43 (12.9%) | 57 (19.4%) |
| | No information | 278(93.6%) | 283 (91.9%) | 193 (63.7) | 102 (30.5%) | 83 (28.2%) |

^a Patients able to drink assumed they are alert if level of consciousness is not documented.

^b patients documented as able to drink or alert assumed they are not shocked hence pulse assumed not weak if pulse character not documented.

Appendix 5c: Documentation of key clinical characteristics for patients with malnutrition.

| Key signs | Possible outcome of assessment | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|--------------------------------|-------------|-------------|-------------|-------------|-------------|
| | | N=274 | N=223 | N=246 | N=179 | N=197 |
| | | n (%) | n (%) | n (%) | n (%) | n (%) |
| Weight- for- height/length Z score /ratio | <-3SD or <70% | 0 | 5(2.2%) | 0 | 5(2.8%) | 36 (18.3%) |
| | ≥ -3SD or ≥ 70% | 0 | 1 (0.5%) | 0 | 5(2.8%) | 9 (4.6%) |
| | No information | 274 (100%) | 217 (97.3%) | 246 (100%) | 169 (94.4%) | 152 (77.2%) |
| visible severe wasting | Visible severe wasting present | 151(55.1%) | 121 (54.2%) | 114 (46.3%) | 96(53.6%) | 98(49.8%) |
| | No visible severe wasting | 10(3.7%) | 4 (1.8%) | 7 (2.8%) | 5(2.8%) | 5(2.5%) |
| | No information | 113 (41.2%) | 98 (44.0%) | 125 (50.8%) | 78(43.6%) | 95(47.7%) |
| oedema | Oedema | 103 (37.6%) | 73(32.7%) | 39 (15.9%) | 60(33.5%) | 52(26.4%) |
| | No Oedema | 90 (32.9%) | 88 (39.5%) | 109(44.3%) | 74(41.3%) | 74(37.6%) |
| | No information | 81 (29.6%) | 62 (27.8%) | 98(39.8%) | 45(25.1%) | 71(36.0%) |

Appendix 6a: Odds ratio of process indicators for diarrhoea patients using M-H test

| Process indicator | Unadjusted OR (95% CI) | Adjusted OR for Age group (95% CI) | Adjusted OR for weight (95% CI) | Adjusted OR for diarrhoea duration (95% CI) |
|-------------------|---------------------------|--|------------------------------------|---|
| Classification | 3.209; (1.985-5.187) | 3.244; (2.00-5.528) | 3.294; (2.024-5.361) | 3.308; (2.203-5.409) |
| IV fluid therapy | 2.679; (1.878-3.822) | OR for 2-11months 2.809; (1.836-4.296) | 2.8714; (1.995-4.132) | 2.815; (1.961-4.042) |
| | | OR for 12-59 months 7.173; (2.420-21.259) | | |

Appendix 6b: Odds ratio of process indicators for pneumonia patients using M-H test

| Process indicator | Unadjusted OR (95% CI) | Adjusted OR for sex (95% CI) |
|-----------------------------------|---------------------------|---------------------------------|
| Adequacy in assessment | 21.250 (7.891-57.224) | 22.848 (8.15-63.995) |
| Classification | 15.279 (9.101-25.651) | 15.659 (9.246-26.520) |
| Crystalline penicillin therapy | 8.312 (5.038-13.713) | 8.710 (5.204-14.579) |
| Gentamicin therapy | 29.132 (12.612-67.286) | 28.210 (12.301-64.695) |

Appendix 6c: Odds ratio of process care indicators for severe malnutrition using M-H test

| Process indicator | Unadjusted OR (95% CI) | Adjusted OR for Age group (95% CI) | Adjusted OR for weight (95% CI) |
|---------------------------|---------------------------|---------------------------------------|------------------------------------|
| Adequacy in assessment | 0.841 (0.579-1.221) | 0.855 (0.587-1.244) | 0.847 (0.587-1.223) |
| Classification | 1.161 (0.732-1.841) | 1.174 (0.739-1.866) | 1.135 (0.714-1.806) |
| Feed therapy | 21.687 (11.332-41.505) | 21.577 (11.274-41.300) | 21.359 (11.198-40.742) |

Appendix 7: Operational definitions of quality indicators in classification

| Disease | ETAT+ terms ^a |
|---------------------|---|
| Pneumonia | Severe pneumonia , very severe pneumonia |
| Severe malnutrition | Severe malnutrition, oedematous malnutrition, PEM , marasmic-kwashiorkor, kwashiorkor, marasmus |
| Diarrhoea | Shock, severe dehydration, some dehydration and no dehydration |

^a Though the same terms for pneumonia and dehydration used in CPGs have existed in WHO publications since the 1990's, they have only recently been incorporated in standard textbooks for paediatrics. In contrast the terms used for syndromic classification of malnutrition to help refine a diagnosis of 'severe malnutrition' have been used in standard textbooks for over four decades.

Appendix 8: Operational definitions of quality indicators in treatment practices

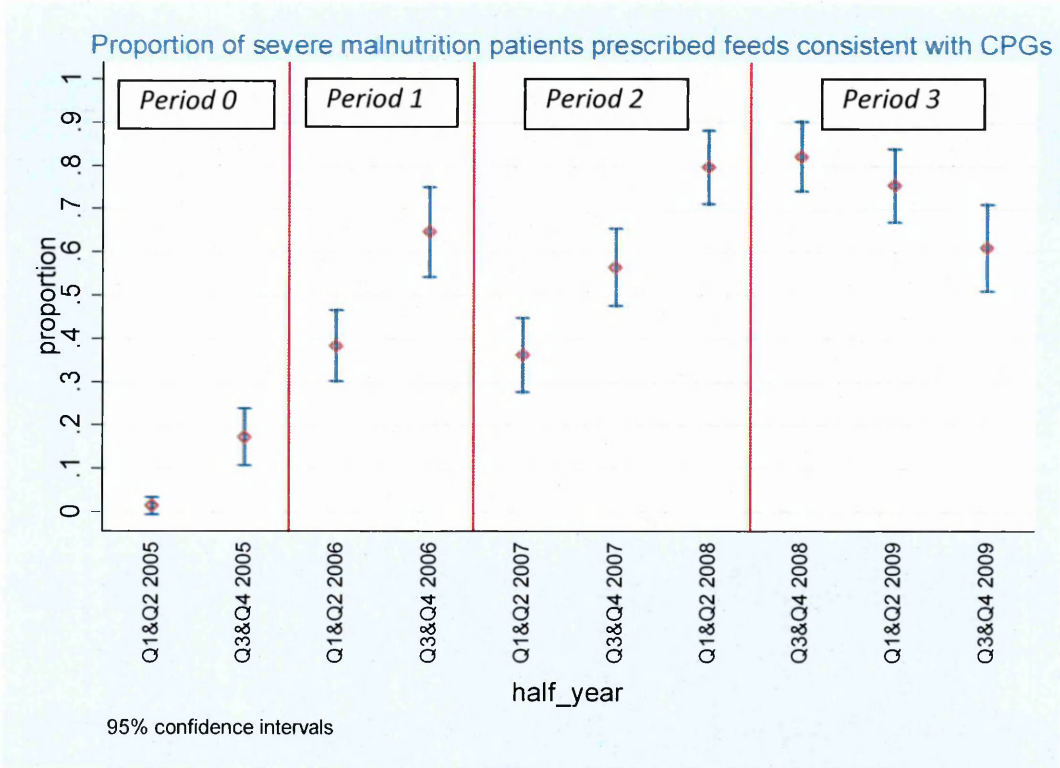
| Indicator | Treatment practices consistent with CPGs |
|---|---|
| Dosage of crystalline penicillin for pneumonia patients | Crystalline penicillin 50,000units/kg/dose X 4 per day (+/-20%). |
| Dosage gentamicin for Pneumonia patients | Gentamicin 7.5 mg/kg/day X 1 per day (+/-20%) |
| Intravenous fluid for severe dehydration | <p>Correct fluid: Hartman’s solution (or dextrose added at 2.4-6.0 mg/kg/min)^a</p> <p>Correct volume (+/-20%): 80-120 mls per kg if not given bolus for shock management or 56-120 mls per kg if given bolus for shock management</p> <p>Correct duration: 5-6 hours for patients ages 2-11 months and 2.5-3 hours in patients aged 12-59 months</p> |
| Feeds for severe malnutrition | <p>Correct feed: F75</p> <p>Correct volume: 100-130 mls/kg (+/-20%) day (volume per day/kg= volume prescribed per feed x frequency/body weight in Kg)</p> |

^a Approximates dextrose requirement for a sick child 3-5mg/kg/min (+/-20%)

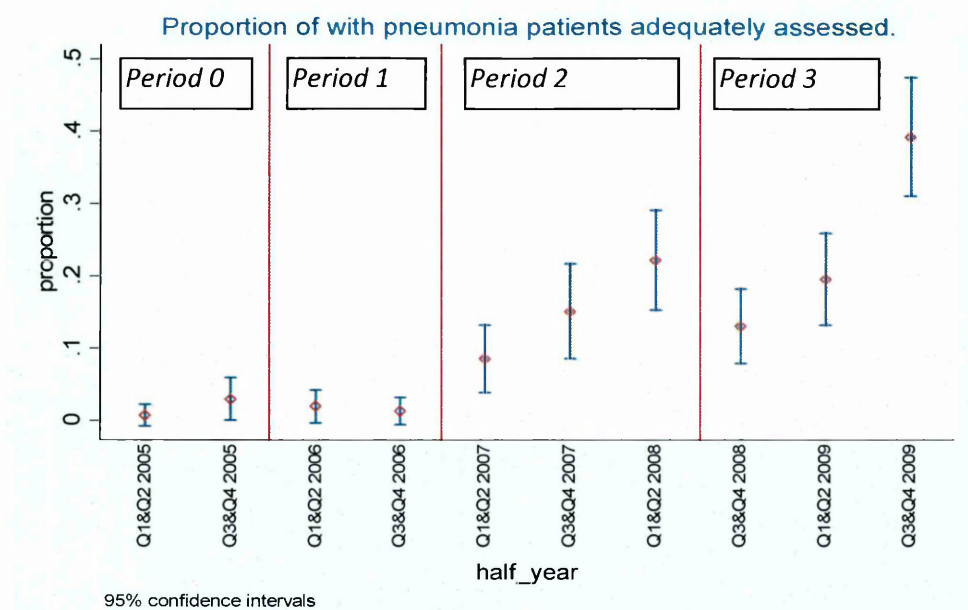
Appendix 9: Operational definitions of quality indicators in follow-up care

| Indicator | Restriction of analysis |
|--|--|
| Evidence that doses of Crystalline penicillin were given as prescribed in the first 48 hrs of admission ^a | Patients prescribed crystalline penicillin 6hrly, crystalline penicillin not stopped in the first two days and patient was alive after 2 days of admission. |
| Mean number of Crystalline penicillin doses given in the first 48hrs of admission ^a | Patients who survive beyond 2 days and whose doses entered as missed and those entered as given add up-to 8 and whose treatment was not stopped. However, patients were included in the analysis if dose is changed. |
| Evidence that intravenous fluid (IV) therapy for severe dehydration was monitored | Patients with evidence that IV fluid was prescribed on the ward on admission or the PEU fluid was continued. |
| Evidence that intake of feeds for severe malnutrition was monitored ^a . | Patients who had feeds prescribed and survived after the first day of admission. |

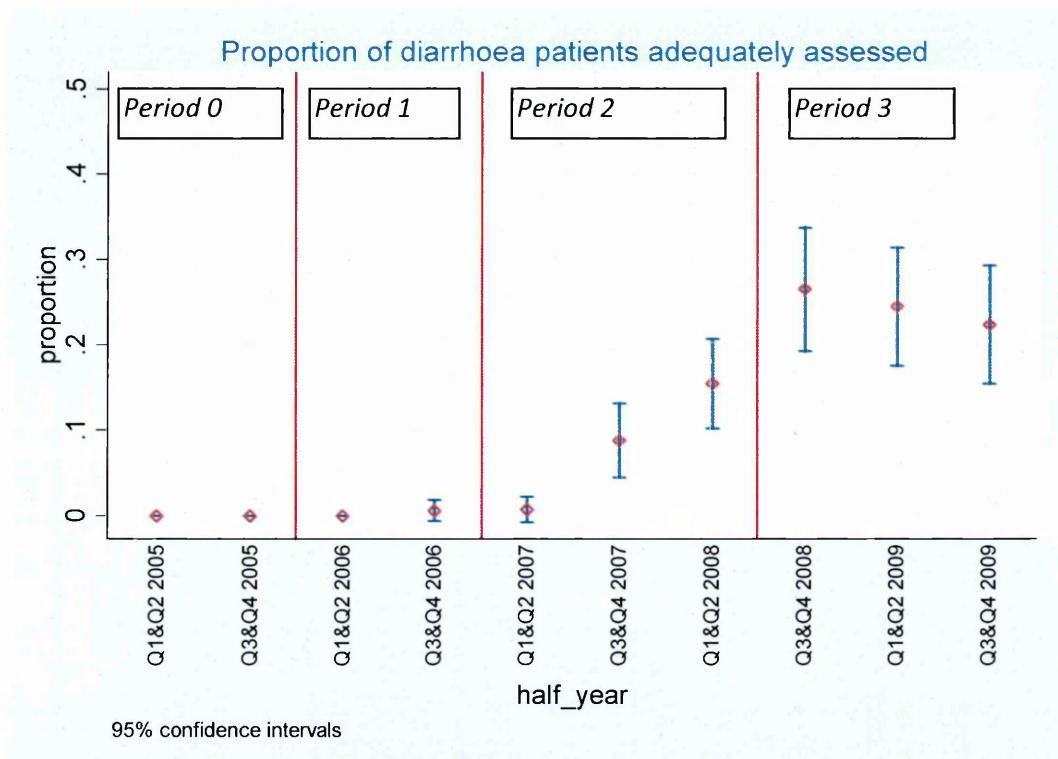
^a An allowance of 12 hours is given from the time of admission to the wards to the time of administration of 1st dose on the wards. If time of admission was missing, the time treatment was administered in PEU is used as a proxy for time of admission. So treatment is considered given on time if it is given within 12 hours from the time of admission.



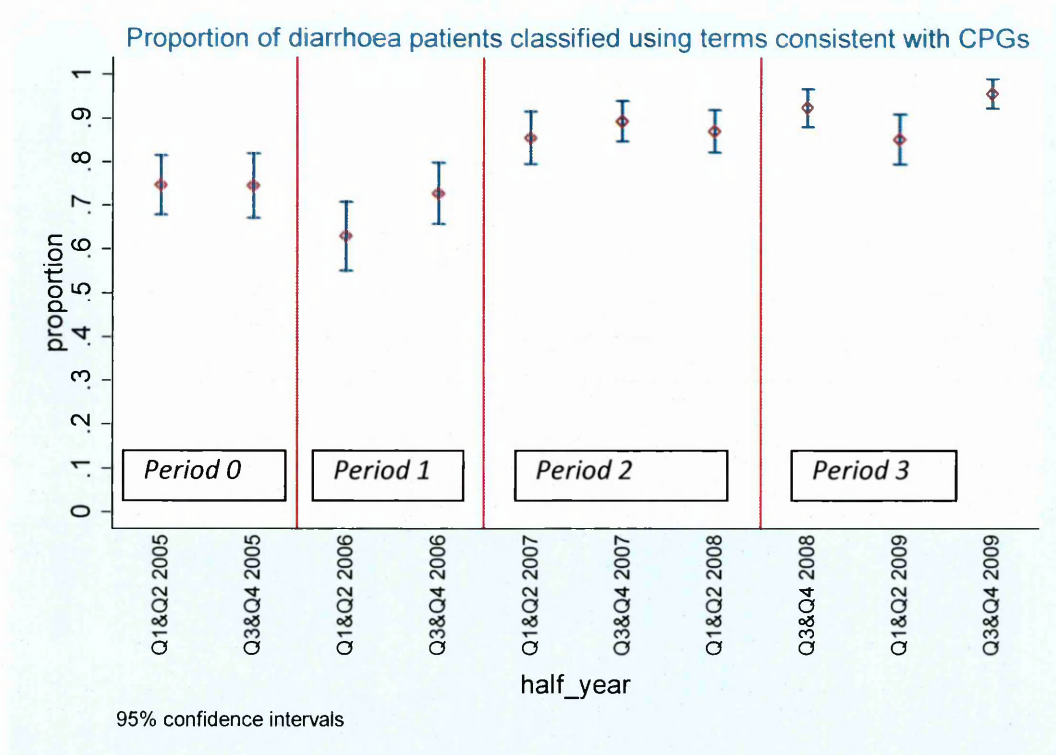
Appendix 10: Trend of change for six monthly mean (95%CI) performance for prescription of feeds for severe malnutrition with varying intensity of intervention.



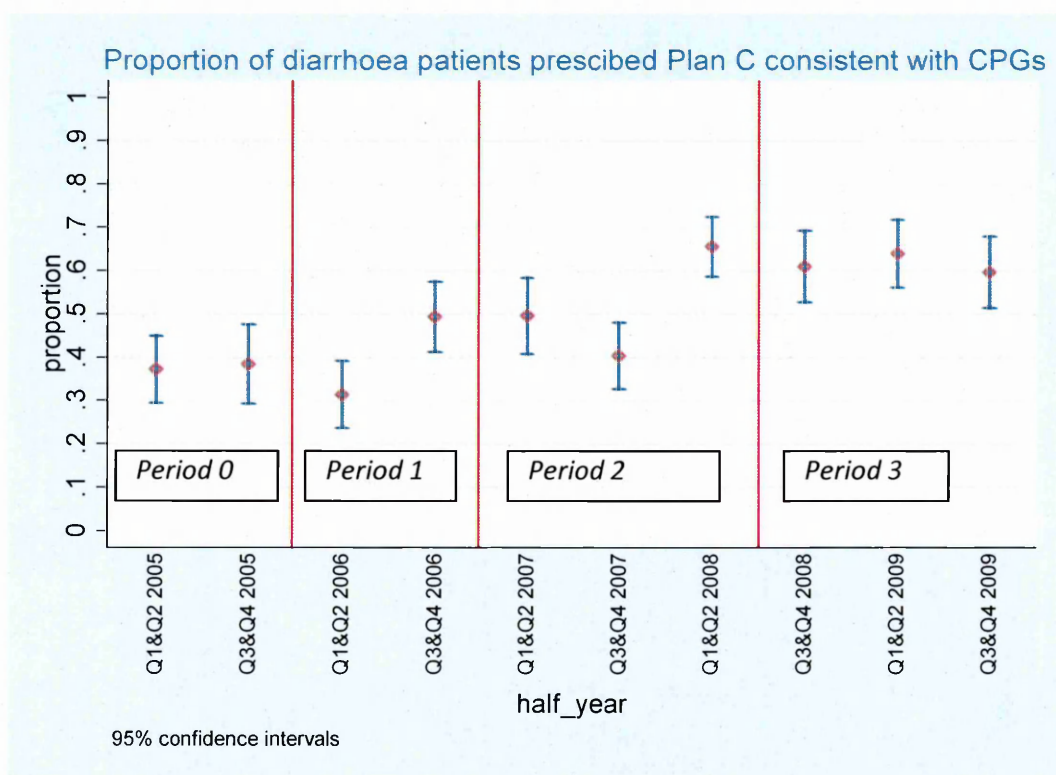
Appendix 11a: Trend of change for six monthly mean (95%CI) performance for adequate assessment of pneumonia patients with varying intensity of intervention.



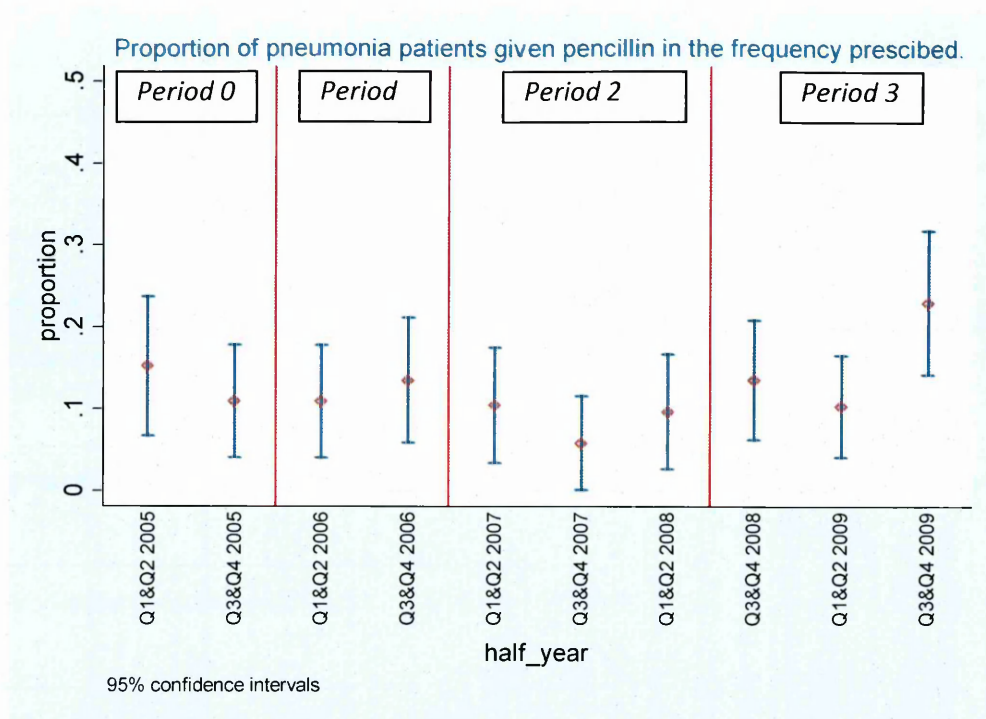
Appendix 11b: Trend of change for six monthly mean (95%CI) performance for adequate assessment of diarrhoea patients with varying intensity of intervention.



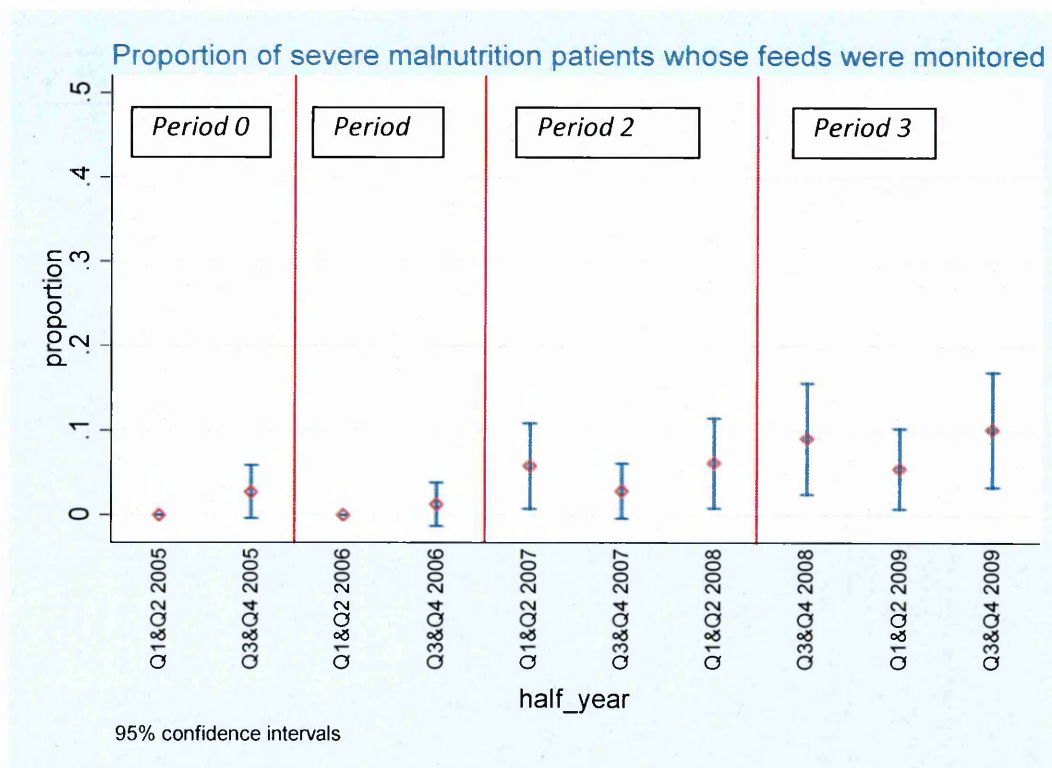
Appendix 11c: Trend of change for six monthly mean (95%CI) performance for classification of diarrhoea patients with varying intensity of intervention.



Appendix 11d: Trend of change for six monthly mean (95%CI) performance for fluid therapy for diarrhoea patients with varying intensity of intervention.



Appendix 12a: Trend of change for six monthly mean (95%CI) performance administration of penicillin for pneumonia patients with varying intensity of intervention.



Appendix 12b: Trend of change for six monthly mean (95%CI) performance for monitoring of feeds for severe malnutrition with varying intensity of intervention.